

**PRESERVATION OF DIGITAL CONTENTS IN ENSURING FUTURE ACCESS  
TO INSTITUTIONAL REPOSITORY DATA: A CASE OF KAIMOSI FRIENDS  
UNIVERSITY LIBRARY, VIHIGA COUNTY, KENYA**

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## ABSTRACT

The current academic and scholarly research work is increasingly leading to digital output and it is incumbent upon institutions to establish ways for creating, collecting, managing and preserving these digital assets for future access in IRs. Future access to digital content can only be realized when the content is preserved appropriately to the recommended standards based on the technological developments. This work sought to investigate preservation of digital contents in IRs vis-a-vis future access to this content. Study objectives were to investigate existing preservation policy framework for preservation of digital content in IR in Kaimosi Friends University; to determine the digital preservation strategies implemented for IR in Kaimosi Friends University; to establish the support of University Management Board for preservation of digital content in IR in Kaimosi Friends University and to establish challenges encountered in preservation of digital content in IR in Kaimosi Friends University. Scholarly focus was grounded in chain of preservation model. Descriptive research design was employed. The research encompassed a comprehensive survey of the 46 members of the library staff, including the chief librarian. The data collection instruments employed included an interview schedule and a questionnaire. A preliminary survey was initiated at Kibabii University Library. The instrument underwent validation via scrutiny by authorities in the domain of information science. Test-retest technique was employed to evaluate instrument reliability. Analysis of data was conducted utilizing SPSS, with the findings meticulously presented through tables and figures. It was established that the institution had a digital preservation policy but was neither published in IR website nor in the DOAR and its annual review and audit wasn't being done as envisaged in the policy. The notable strategies for digital preservation implemented in the IR included the preservation of backup technologies and the migration of information. Participants indicated that the university administration demonstrated a commitment to digital preservation efforts, with significant backing stemming from the engagement of senior library staff in decision-making process. Implementation of digital preservation within institutional repositories is fraught with numerous challenges, including, but not limited to, financial limitations, insufficient technical expertise, and inadequate infrastructural resources. It was suggested that Kaimosi Friends University ought to disseminate the digital preservation policy on the institutional website that hosts the IR, as well as in the DOAR, and that an annual audit and review of the policy should be conducted. The research recommends that Kaimosi Friends University uphold prevalent strategies of digital preservation, specifically information migration, backup, and technology preservation. Moreover, it is advisable for the university management board to maintain the support it provides to the library, especially concerning the preservation of digital content for future accessibility. The research recommends a need for additional investigation into the digital preservation methodologies employed within institutional repositories in academic libraries. Since continued availability of IR contents hinges on the efforts dedicated to their preservation

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**ACRONYMS AND ABBREVIATIONS**

<b>APA:</b>	American Psychological Association
<b>ARL:</b>	Association of Research Libraries
<b>CD-ROM:</b>	Compact Disc Read Only Memory
<b>DKUT:</b>	Dedan Kimathi University of Technology
<b>DOAJ:</b>	Directory of Open Access Journals
<b>DOAR:</b>	Directory of Open Access Repositories
<b>ERIC:</b>	Education Resources Information Center
<b>IKS:</b>	Indigenous Knowledge System
<b>INASP:</b>	International Network for the Availability of Scientific Publications
<b>IR:</b>	Institutional Repository
<b>JKUAT:</b>	Jomo Kenyatta University of Agriculture and Technology
<b>KAFU:</b>	Kaimosi Friends University
<b>KU:</b>	Kenyatta University
<b>NACOSTI:</b>	National Council for Science, Technology and Innovation
<b>SPSS:</b>	Statistical Package for Social Sciences
<b>UoN:</b>	University of Nairobi

## OPERATIONAL DEFINITION OF TERMS

**Digital Content:** Intellectual information and data that exists primarily in the digital form or format and whose mode of access is through a computerised device.

**Digital Preservation:** A systematic and continuous array of processes and activities designed to guarantee the enduring, flawless preservation of digital information for the duration of its necessity.

**Institutional Repository:** Digital collections meant for capturing, storing, preserving, indexing and disseminating intellectual output in research and academic institutions.

**Policy Framework:** Guidelines providing criteria for selection of content, submission and how it will be preserved and accessed.

## CHAPTER ONE

### INTRODUCTION AND BACKGROUND TO THE STUDY

#### 1.0 Introduction

This chapter provides background information, the problem, study purpose, objectives and questions, significance, limitations and its scope. The chapter finally concludes with the theoretical and conceptual frameworks and defines terms as used in the context of this study.

#### 1.1 Background to the Study

Globally, institutions are increasingly required to develop effective strategies for the collection, management, and preservation of digital assets to guarantee their accessibility for future use, as academic research outputs become predominantly digital. The scholarly contributions of institutions are now primarily represented and disseminated through digital platforms, particularly Institutional Repositories (IRs) (Lynch, 2003). These repositories curate digital materials to guarantee their worldwide accessibility and long-term preservation (Li & Banach, 2011). Digital preservation, therefore, is a critical approach that ensures scholarly content remains accessible despite technological changes (Fabunmi et al., 2009).

Even with the advances in technologies in the world, there are hurdles in the digital preservation area. As an example, Voutssas (2012) explains that the countries of Latin America have undergone a geometric increase in the production of digital content, but there is no adequate strategy of preservation, which is threatening future accessibility. Moreover, Da Silva and Borges (2017) determined that in Brazilian Federal Universities, there are at

least 26 IRs that lack a published digital preservation policy, but some universities have tried to update their institutional information policies in order to stress on preservation commitment.

Africa has not completely incorporated the available information technologies in the academic activities at the continental level (Ezema, 2013). The level of research activities carried out on the continent is still very low, and the research output generated is usually not fully utilized in the global scenario. The partial adoption of information technologies is still influencing the visibility of scholarly digital content of the African universities, which is also very concerning in terms of how such content would be preserved and accessed in the future (Anyaoaku et al., 2019). As it was noted by Baro and Kari (2016), the policy of digital preservation is not proper in the libraries of Nigerian universities, and the migration of information is one of the few approaches that institutions in ten English-speaking countries of Africa use to preserve information in a digital mode (Anyaoaku et al., 2019).

In East Africa, existing gaps are still further reflected through certain studies. As an illustration, researchers working in six universities of Kenya are largely dependent on individual efforts in the preservation of their academic output, and they use institutional repositories to a very little extent (Moseti, 2016). Also, the involvement of the university management in African nations, such as Kenya, is not always secure, which is mainly caused by the absence of specific resources, the inefficient policy system, and the lack of capacity-building operations (Adjei et al., 2019; Moseti, 2016). Policy gaps, resource shortage, and a lack of technical expertise are some of the challenges facing the

establishment of sustainable approaches to digital preservation in different African institutions (Mapulanga, 2013; Njagi & Namande, 2018).

In Kenya, there are still issues of digital preservation of scholarly material. It has been reported that universities like Kirinyaga, Machakos, and Embu have been struggling with the lack of resources and policy concerns that hinder successful digital archiving (Njagi & Namande, 2018). Despite the fact that Dedan Kimathi University of Technology (DKUT) has been researched by Anyaoku et al. (2019), the study did not provide a clear answer to the question of preservation strategies used. Moreover, the management of Kenyan universities is usually not very supportive of the adoption of digital preservation strategies, which adds to the uncertainty of the future accessibility of intellectual output (Moseti, 2016).

Particularly, in Kaimosi Friends University (KAFU), a public university in western Kenya, there is a move to participate in teaching, as well as research activities, with the help of an institutional repository managed by the library. The repository supports the collection, management and sharing of scholarly works created by students and faculty. Nevertheless, it is not clear how much KAFU has developed or adopted a digital preservation policy. This can be attributed to either the lack of a formal policy framework or ignorance about the significance of the same. The main idea of the research is to determine the relationship between the digital preservation activities and the future availability of the scholarly materials in the institutional repositories with KAFU library as an example.

## **1.2 Statement of the Problem**

Proliferation of scholarly and scientific knowledge generated by universities globally is a direct consequence of the research endeavours undertaken by both students and faculty members. The employment of institutional repositories for the management of research outputs, especially those that are open access, ensures enhanced accessibility and consequently leads to increased citation rates compared to subscription-based alternatives. Nevertheless, the future availability of institutional repository contents may be jeopardized if libraries fail to prioritize digital preservation.

Digital preservation often tends to be overlooked, primarily because it is not a routine service. This oversight is exacerbated by the enormous amount of academic work that is created and saved in repositories, as well as the many administrative, operational, and technological responsibilities that institutions have to bear. As a result, the digital contents within the IR may be inaccessible. It is essential to make adequate investments across the data lifecycle to tackle challenges related to access, compliance, migration, metadata, cataloguing, and data requirements, thereby ensuring long-term preservation for future accessibility. The library's ability to help ensure digital content's long-term preservation through institutional repositories is crucial to the institution's ability to support academic goals and purposes by ensuring that scholarly resources are visible and accessible in the future. Given this, it became critical to conduct research on digital content preservation to guarantee that the institutional repository's contents will be accessible in future.

### **1.3 Purpose of the Study**

To investigate preservation of digital content through institutional repositories with the aim of ensuring future access at Kaimosi Friends University library.

### **1.4 Objectives of the Study**

The objectives of this study were to;

1. Investigate the existing preservation policy framework for preservation of digital content in the institutional repository in Kaimosi Friends University library.
2. Determine the digital preservation strategies implemented for the institutional repository in Kaimosi Friends University library.
3. Establish the support of the University Management Board for the preservation of digital content in the institutional repository in Kaimosi Friends University library.
4. Establish the challenges encountered in the preservation of digital content in the institutional repository in Kaimosi Friends University library.

### **1.5 Research Questions**

The research questions were;

1. What preservation policy framework exists for the preservation of digital content in the institutional repository in Kaimosi Friends University library?
2. Which digital preservation strategies are implemented for the institutional repository in Kaimosi Friends University library?
3. What support does the university management board offer for the preservation of digital content in the institutional repository in Kaimosi Friends University library?

4. What are the challenges encountered in the preservation of digital content in the institutional repository in Kaimosi Friends University library?

### **1.6 Significance of the Study**

First, the research will be beneficial to KAFU. The study aimed to gather and enhance knowledge concerning the preservation of digital content to ensure future accessibility to the institutional repository at KAFU. The study provided both pragmatic and impartial perspectives on the enduring availability of digital materials archived within an institutional repository. The research could prove beneficial to the institution, having pinpointed effective methodologies for ensuring sustained access to preserved digital content within institutional repositories.

Additionally, the investigation is advantageous to academicians and researchers. In particular, individuals who are contemplating conducting related research or who may require literature regarding the accessibility of intellectual digital content preserved in IRs at Kaimosi Friends University. Furthermore, the researchers may find the areas recommended for further research to be beneficial and contribute to the development of this work. Literature in this research may serve as local benchmarks for reference, in addition to contributing to the corpus of knowledge.

### **1.7 Limitation of the Study**

Research participants may provide answers that appear ideal and do not accurately reflect the current situation due to their apprehension about portraying the University in a negative light. To mitigate this possibility, the researcher justified the necessity of the study and the necessity of providing responses that are both forthright and accurate in an honest manner.

Findings of this study must be applied with utmost care in contexts beyond Kaimosi Friends University, as generalizability may not be wise due to geographical restrictions.

### **1.8 Delimitation of the Study**

Due to the researcher's restricted resources, this investigation was particularly restricted to the library of Kaimosi Friends University. The University Librarian and those directly involved in IR and preservation functions are respondents who are being considered for this study. The IR and access to the content in the IR were connected to the area of focus of study in the library.

### **1.9 Assumptions of the Study**

The study made the following assumptions;

1. Existence of a policy framework regarding digital preservation of IR content.
2. Library personnel are familiar with digital preservation strategies.
3. The University Management Board offers the library adequate support to facilitate preservation of digital content in IR.
4. The university has an established IR.

### **1.10 Theoretical Framework**

This investigation was academically oriented and was founded on the Chain of Preservation (COP) model. The International Research on Permanent Authentic Records in Electronic Systems (InterPARES) project was responsible for the development of this model. The model conceptually depicts the activities associated with the administration of digital information and illustrates the relationship between the creators of information and preservers of this information. The policy framework is invoked to emphasise the

importance of the content, submission, and preservation policies by illustrating the association between information creators and preservers of information. The library as an institution is the product of the relationship that is either the result of or brought about by the policy framework.

The COP model offers a method for identifying preservation issues and determining how the information can be preserved in the long run. Preservation policies developed by the library serve as the guidelines for determining whether digital content must be preserved for the short, medium, or long term. Therefore, the library must establish a clear and distinct understanding of the strategies that are essential for the preservation of the digital content, according to the preservation period of the content. This activity or procedure is primarily at the library's discretion. The model also underscores the importance of content preservation, ensuring that the content is authentic over time and can be reproduced at any point in its existence. The significance of this is the implementation of digital preservation methods that are suitable and guarantee authenticity, quality, availability, and accessibility of archived content in IRs.

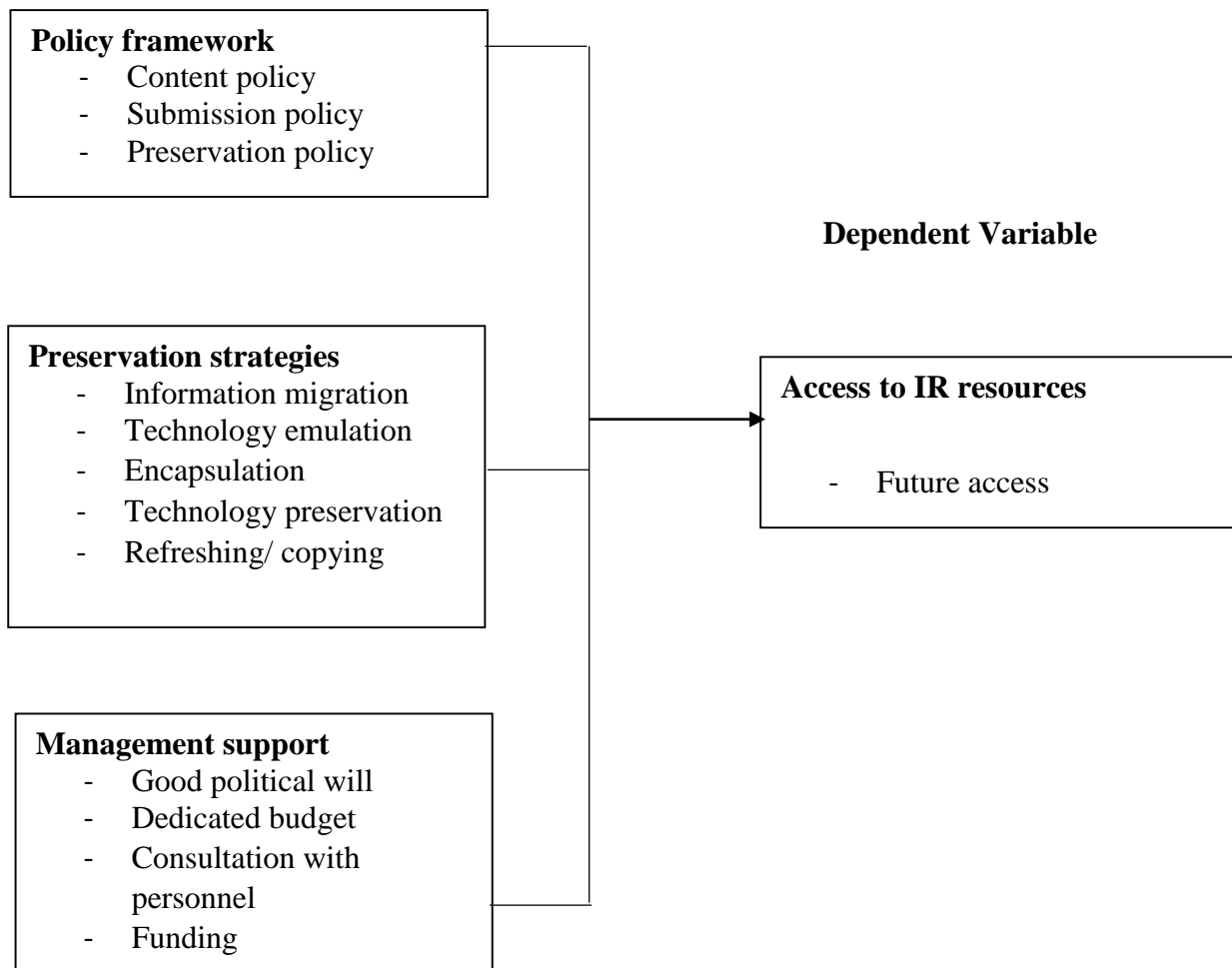
The model acknowledges the obstacles to preservation and management of digital records, and it specifically emphasises that these challenges are inherently dynamic, and that the solutions are tailored to legal and administrative circumstances. The researcher contends that these challenges are associated with the concept of management reinforcement for the digital content preservation program in the IR, as a result of identifying this model fit. The library must ascertain the appropriate requirements and guarantee that the management adheres to the archival principles of scholarly content. In this regard, the researcher contends that management support for preservation may be provided through the

following: the provision of a dedicated budget, the encouragement of personnel capacity, and the consultation of library personnel on such initiatives. Future accessibility to digital content in IR may be accomplished through such endeavours.

### 1.11 Conceptual Framework

The relationship between the dependent variable and the independent variables is illustrated in Figure 1.1.

#### Independent Variable



**Figure 1.1: Conceptual Framework**

**Source: (Researcher 2022)**

The above graphical representation illustrates that digital preservation of scholarly content is influenced by factors such as the policy framework, preservation strategies, and management support. The policy framework includes policies regarding the content of the work to be archived, submission policies, and preservation policies. Information migration, technology, encapsulation, emulation, preservation, and refreshing are the preservation strategies that would assure preservation for a short, medium, or long time, depending on the preservation policy. Last, the effectiveness of digital preservation of scholarly content may be contingent upon dedicated budgets, development of the personnel's skills and knowledge capacity.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **2.1 Introduction**

The section outlines a thorough examination of literature, systematically arranged according to themes that arise from research objectives. The themes are delineated as follows: (a) the framework for preservation policy concerning digital content within institutional repositories, (b) strategies for the preservation of digital materials in institutional repositories, (c) role of institutional support in preservation of digital content within these repositories, and (d) the challenges encountered in the preservation of digital content in institutional repositories. The chapter culminates in a synthesis and the delineation of research gaps that emerged throughout the literature review. Literature examined emanates from reputable online sources, books, conference proceedings, research papers, theses and dissertations, as well as peer-reviewed journal articles.

#### **2.2 Preservation Policy Framework for Preservation of Digital Content in IRs**

In this study, a policy is a guiding document that casts light on current practices and understanding about the preservation of digital materials to guarantee tomorrow's access to these materials. A policy should be a genuine reflection of current practice; otherwise, it may be misleading. The significance of digital preservation policy is that it emphasises the fact that information services are a component of a system that is based on established practices (Morrow, 2000). The maintenance of order and quality of practices in the preservation of digital materials is contingent upon standardisation of practices. The existence of an explicitly published policy is indicative of institutional dedication to digital

materials preservation initiatives, as the policy must be approved by the highest-ranking university officials.

The institutional repositories of the 26 Brazilian Federal Universities enrolled in the Directory of Open Access Repositories (DOAR) have no published digital preservation policies (Da Silva & Borges, 2017). It is necessary to note that there is likely to be conflicting information in these repositories because there are those who have stated that they intend to store digital information in their organisational information policy, but they do not have a digital preservation policy. It implies that the goal of the establishment of IRs, namely, the long-term preservation of materials, is defeated by the absence of guaranteed access to digital materials in IRs in this state. To ensure published policies on digital preservation, the authors of the current study checked the information on the websites of these IRs and in DOAR.

After trying to highlight the current situation regarding digital preservation policies, it was established that 26 percent of the member institutions of the Association of Research Libraries (ARL) had digital preservation policies (Dressler, 2017). This researcher in this study aimed to find out the positive sides and gaps of digital preservation policies of ARL member institutions. Intriguingly, ARL member institutions are composed of the most developed countries, yet only 26% have digital preservation policies. These are the nations from which the developing nations must derive the most effective practices. The study revealed that both effective and ineffective digital preservation policies were identified. The implementation of the policy framework may be impeded by a multitude of issues as a result of ineffective digital preservation policies.

Focusing exclusively on academic libraries, Adjei et al. (2019) conducted a qualitative study on digital preservation in IRs in Ghana. The authors of the study addressed the concept of policy framework to long-term digital preservation. The study observes that the surveyed libraries lacked a general IR policy, and one of them had a dedicated policy on future access to the digital content in their IRs. A digital preservation policy that is explicitly published serves as an official charter to provide guidance on the functions associated with digital preservation. The absence of the policy in these institutions ensures that future access to digital content in IR generated by the university is not guaranteed due to the absence of standards to guide the preservation functions. Continuous access to content in IR that has a preservation capability should not be derived from a general library policy, but rather from a specific policy, specifically a preservation policy (Da Silva & Borges, 2017).

Institutional repositories are not exclusively restricted to academic institutions; they also encompass institutions that are dedicated to safeguarding critical information for future access, without the risk of accidental or intentional modification. A repository's objective necessitates a policy plan, regardless of the institution. Balogun and Kalusopa (2021) conducted a study in South Africa on digital preservation plans and policies to ensure continuous digital preservation. Research focused on the preservation of Indigenous Knowledge Systems (IKS) and adopted a multiple case study research design to acquire data via face-to-face interviews. The institutions examined by the researchers did not have digital preservation guidelines in place for long-term preservation. The present study

concentrated on academic intellectual output, despite the importance of indigenous knowledge for the future generation.

Anyaoku et al. (2019) discovered conflicting results in their investigation of digital preservation practices in specific university libraries in Africa. The authors conducted a detailed examination of specific university libraries in Zimbabwe, South Africa, Nigeria, Tanzania, Sudan, Kenya, Egypt, Lesotho, Ghana, and Uganda. The researchers established that the digital preservation policies were present in all the institutions to guide the execution of the preservation of the IR contents. Such findings are contrary to those of other scholars (Adjei et al., 2019; Balogun & Kalusopa, 2021; Kalusopa & Zulu, 2009), who failed to notice the policies in the institutions they studied. The strength of the policies, however, is not apparent because other policies are ineffective and weak in their capacity to promote sustainable preservation.

Umana (2019) studied the digital preservation processes of the digital contents of the IRs of the University of Namibia and the Namibia University of Science and Technology libraries in Namibia. The study looked into the policies and practices governing and safeguarding long-term access to scholarly digital materials that has been archived in the IRs. The data was collected using the qualitative research method by means of a semi-structured interview protocol. It was important to this study to find out that the respondents had significantly little or no knowledge about the long-term digital preservation of content and how to make them accessible. The research also noted that the digital preservation guidelines and policies of content in the IRs of the two institutions had not been accorded

the relevant attention. An indicator of the impossibility of ensuring long-term access to digitally preserved contents in IRs is the limited understanding of the concept of long-term digital preservation, when combined with policy challenges. Barrueco and Termens (2022) conducted a systematic review of the literature to examine the implementation of policies and plans related to digital preservation in IRs. Policies and plans serve as the foundation for preservation activities and functions. The researchers examined 21 journal articles that were published between 2009 and 2020. It was observed that the research output on this topic was extremely limited. Barrueco and Termens (2022) were unable to determine how IR managers are implementing digital preservation in their literature review. It raises the question of whether the policies in existence are being followed during the implementation of digital preservation, or whether policies indicate formalities in these institutions. Intriguingly, the reviewed articles acknowledged the existence of policies regarding digital preservation; however, there is no evidence of the implementation status of these policies. This particular research will establish a local benchmark within the current study area and enhance the existing body of literature on the topic.

Electronic Information for Libraries (EIFL) is an international nonprofit organisation which supports libraries in developing and transition economy countries, particularly in the popularisation of Institutional Repositories (IRs). EIFL has contributed significantly to the development of open access, including technical assistance, advocacy, training, and capacity building, especially in regions where IRs had not been established (Swan & Chan, 2009; EIFL, 2021). The organisation has also expanded the capacity of librarians and repository managers so that institutions can develop sustainable policies and infrastructure

(Bosire, 2020; Melekwe et al., 2019). The collaborations of EIFL and universities and national research organisations in countries like Kenya, Uganda, and Ghana have increased the visibility of the local scholarly production (Ndiaye et al., 2013). However, certain issues, such as a lack of funding and institutional support, remain, which is why the role of EIFL is to be considered (Anyaku et al., 2019).

### **2.3 Digital Preservation Strategies for Institutional Repositories**

The new literature classifies the digital preservation strategies into two broad categories, i.e., technology-based and organisational or management-based strategies. Technological preservation implies such interventions as migration, when digital content is regularly moved to newer formats to prevent obsolescence, and emulation, which is the re-creation of the obsolete hardware or software environment to enable access to digital files (UNESCO, 2019). Organisational strategies, on the other hand, are aimed at the use of standards, creation of detailed metadata to describe resources, inter-institutional cooperation, and creation of sustainable preservation infrastructure (Conway & Harlow, 2020). A combination of these offers technical sustainability as well as institutional support to ensure that digital preservation is successful. Moreover, the contemporary sources state that the effectiveness of these strategies depends mainly on policy frameworks, institutional support, and capacity building within the organisations that work with digital assets (Tibenderana & Okwang, 2023)

Nevertheless, the latest literature points out that digital preservation strategies may be generally divided into short-term and active long-term strategies, namely, preserving technology (e.g., archiving hardware in a museum-like fashion), emulation, and migration, all of which have their advantages and limitations (UKOLN, 2004; Caplan, 2013).

Preservation of technology, including retention of original hardware and software, is normally not sustainable in the long run because of space, cost and degradation factors (UKOLN, 2004; Thibodeau, 2002). Emulation, which recreates legacy environments on modern systems, provides a scalable method of maintaining look and feel and rendering fidelity. However, it needs to have extensive metadata, thoughtful overlay of virtualisation, and continuous adjustment to new platforms (Acker, 2021; Caplan, 2013). Migration, which is the frequent transformation of content to up-to-date formats, will guarantee accessibility but may cause data loss and is a resource-intensive process over large, heterogeneous collections (UKOLN, 2004; Wikipedia, 2025). Newer techniques such as Universal Virtual Computer (UVC) integrate emulation and migration by storing decoders as well as data with the goal of preserving robustly and platform-independently over decades (Lorie, 2000; Appuswamy & Joguín, 2020). All methods require some trade-offs among authenticity, sustainability, cost and fidelity, and a hybrid, risk-averse strategy that is consistent with Open Archival Information System (OAIS) models is currently the recommended approach to successful digital preservation planning (Caplan, 2013; Thibodeau, 2002).

According to Santos and Flores (2017), the strategies for digital preservation are also arranged according to their priorities for preserving the three levels of digital objects: the physical level, which includes the hardware and support integrity, integrates content refreshes or recopies in more modern media; the logical level, which includes the software and the original bit chain integrity, includes emulation, technology preservation, and the gathering and encapsulation of all necessary information for object access and interpretation; and the conceptual level, which includes migration and the visual

representation of content interpreted by humans. The various approaches to digital preservation, according to Márdero Arellano (2008), Santos e Flores (2015, 2018), can generally be divided into two categories: structural strategies, which are the institutional investments made initially to create a suitable environment for digital preservation, and operational strategies, which are the actual steps that the relevant organizations will take to preserve digital objects physically, logically, or conceptually.

Barrueco and Termen (2022) conducted a comprehensive examination of existing literature about the execution of digital preservation practices, methods, and initiatives by institutional repositories. The aim was to determine, among the documented experiences, the extent to which they are effectively serving the purpose of guaranteeing the sustained accessibility of the stored materials. An analysis of 21 papers from worldwide refereed journals published from 2009 to 2020 is conducted using a systematic literature review approach. The scholarly output on this topic is somewhat restricted. The limited number of published papers indicates that repository managers have prioritised concerns other than ensuring long-term availability of stored assets. A review of the literature never uncovered conclusive information about the implementation of digital preservation in institutional repositories. What is especially remarkable is the dearth of literature specifically addressing Europe's situation. Further field investigations are required. They would allow them to draw out the findings and come up with the best practices to help the managers improve on the preservation activities. The analysis showed that repository managers are not keeping their promises as far as one of the main functions of institutional repositories is concerned, namely, the preservation of scholarly materials over the long term and their permanent availability. Repository managers as custodians of digital scholarly assets have

the role of developing, implementing, and maintaining preservation strategies and policies. There is a need to work further in this area to consolidate their capacity, improve institutional support and effective delivery of this important mandate

Kari and Baro (2016) have attempted to analyse the digital preservation of institutional repositories (IRs) in Nigeria. The data gathered by the information retrieval systems used in the university libraries in Nigeria was done in a three-pronged method; first by telephonic interviews, then by a review of the websites and finally by issuing a questionnaire. Through phone interviews of librarians and careful examination of the websites of the 141 accredited universities in Nigeria, the researchers have revealed that only 15 university libraries in Nigeria have adopted institutional repositories. Twelve participants were identified to represent their respective university libraries and contacted to fill the questionnaire. The survey results revealed that a significant number of IRs in Nigeria employed DSpace software for the management of their digital content. Furthermore, fifty percent of the information resources were engaged in the transfer of information. The research additionally revealed that a majority of the organisations that participated provide long-term digital preservation services. Unfortunately, the majority of institutional repositories never possess a digital preservation policy to guide the implementation of digital preservation for their heritage materials. Ultimately, the majority of participants articulated a deficiency in adequate long-term financial resources, coupled with a scarcity of essential technical personnel possessing the necessary expertise to proficiently manage and supervise the information retrieval process. Librarians in underdeveloped nations and other information workers may use the results to build

institutional repositories and ensure the digital preservation of electronic materials for the long term.

Cullen & Chawner (2008) delineate a continuous initiative aimed at establishing a knowledge base to facilitate the advancement of institutional repositories in New Zealand. This wiki provides an extensive introduction to the topic by outlining important works of literature, best practices, and standards as they pertain to the New Zealand sector. It also includes case studies that show how institutions in New Zealand have built their repositories so far. Reviewing these case studies sheds light on the various strategic approaches used by institutions in the field. After that, they will be evaluated in light of the concerns raised in the past research. The document also includes an analysis of the perspectives and answers of New Zealand academia and with other important stakeholders, crucial to achievement of national strategy's objectives and sole institutions' efforts, as well as the research team's emerging research areas and a comprehensive national strategy to align institutional methodologies with the New Zealand Digital Strategy's goals.

In a study by Moseti (2016) conducted at the University of KwaZulu-Natal, it was found that academics took steps to secure their institutions' digital assets, but that students and staff seldom made heavy use of the institutions' online storage facilities. This is mostly due to people not fully realizing how important digital repositories are for the long-term storage of digital media. While institutional repositories already exist, the current study shows that further efforts are needed to raise knowledge and acceptance of digital repositories. Moreover, it is critical for the daily activities of the repository management to effectively include digital preservation best practices.

In a study by Samiei (2020) examined on how the digital libraries safeguard the digital content. Results showed that nearly all digital libraries use tactics for establishing permanent identification standards, refreshing, migrating content, and backup supplies. In addition, nearly all libraries (90.91%) back up their collections daily, with some even going so far as to save backup copies on portable storage media like tape libraries and others on mass storage systems like SANs and NASs. In order to prevent malware from infiltrating their digital library system, every member of the assessed community uses virus protection measures and firewalls, in addition to current antivirus software. Every library has some kind of access control system in place and uses verification mechanisms, but only around 10% of libraries utilise information verification to regulate who may use their digital resources. This survey takes into account the unique aspects of the subject matter in Iran, especially when it comes to digital preservation strategies and the practical application of backup supply, media refreshment, and information migration as preservation methods. It is a groundbreaking endeavour and seems to have a significant advantage over similar research.

### **2.3.1 Technology Preservation**

The goal of technology preservation is to keep the original software, operating system, and application program intact (Lee et al., 2002). Those who advocate for the preservation of technology stress the significance of using digital objects in their original environment to maintain its functioning, beauty, and tactile aspects. The system's foundational technological basis is maintained via this technique. Essentially, securing technology involves protecting both the item and the means to access it, which enhances accessibility in the short term (Lee et al., 2002).

Technology conservation is an approach that is both limited in scope and time-bound. According to Márdero Arellano (2008), digital artefacts must be preserved in a way that allows users to access and use them, which means keeping the original hardware and software used for their production or access. The authors state that their method preserves the original layout and functionality in addition to the content and visual presentation of digital resources. Even so, "museums" won't help with the effects of technology becoming obsolete. Important assets in proprietary formats or needs. Outdated software shouldn't be stored there due to space, resource, and technical support requirements.

According to Rothenberg (2000), "computer museums" might play an important role in digital preservation by restoring data from old media and testing emulators with rescued old hardware to see how well they work. Many organisations still practice technology conservation, even if it seems to be declining. The National Library of Australia has painstakingly collected donations of outdated computer systems and software to bolster its collection. This is being done so that important data that has been saved in old digital forms may be retrieved. This is achieved by the library by means of emulators, which allow for the construction of virtual worlds that permit interaction with dated technology (Thorpe, 2020).

### **2.3.2 Technology Emulation**

"Emulation" implies the process of developing and using a contemporary program to mimic the behaviour of a system that is either obsolete or too old to run properly. According to Barbedo, Corujo, and Sant'Ana (2011), this approach keeps digital items' layout and

operation intact while preserving their information and visual integrity. When the original technological context of the objects must be preserved, this method excels because it does not require any specific platforms or systems for maintenance. The authors argue that emulation has limitations when it comes to accurately representing materials over long periods due to the dangers of being overly reliant on emulators and the possibility of obsolescence.

According to Santos and Flores (2015), encapsulation and emulation work together to protect technology, with an emphasis on short- and medium-term goals that necessitate significant financial and technological investments. According to Ferreira, Baptista, and Ramalho (2006), encapsulation means keeping all the important data needed for making converters, viewers, or emulators for the digital item in the future. Assuming allow some directives to allow the comprehension of document formats as substantive material, this strategy helps to preserve the object's fundamental structure.

The technological setting of the object's inception is the primary focus of this approach. This approach deals with the problem of software and hardware obsolescence by creating a copy of the old system or using methods that mimic it in the newer version of the access tools. The idea behind technology emulation is to provide long-term answers for preserving digital assets whose future use is uncertain and whose worth is hard to pin down (Russell, 2000). Maintaining the integrity of digital content, including its look, substance, and context, is the primary goal of emulation.

### **2.3.3 Information Migration**

As Granger (2000) explains, migration entails systematically moving digital materials from one technology framework to another, while keeping the material's key properties intact. Data in digital form is transferred across different software and hardware setups or from one technological development to another. Digital materials should be preserved and made easily retrievable for users; this is the goal of migration (Lee et al., 2002). Although software and hardware may undergo changes and improvements during data migration, the electronic information access is uninterrupted, since the focus on movement is squarely on the digital item and not on its environment. Libraries ought to thoroughly assess modern content management strategies and platforms for digital preservation if they want to follow current best practices. Rapid development is transforming the technology world, which is why this examination is continual. Data migration is an effective method for dealing with problems caused by software and hardware technology becoming obsolete.

### **2.3.4 Encapsulation**

Encapsulation is an essential part of the emulation strategy, according to Lee et al. (2002), which also makes use of other preservation techniques. When it comes to file formats, technical obsolescence is usually a problem. Encapsulation aims to solve this problem. As part of this strategy, a cutting-edge application will be created to make digital information more accessible on upcoming computer systems.

Encapsulating data is combining a digital resource with all the parts that are needed to make sure that the resource can be accessed. This method makes it easier to arrange crucial data needed to prevent a document from being lost. A digital object can be easily identified

with the help of permanent identifiers, which make it accessible even after it has been moved. The subject matter's intrinsic qualities make this feasible. The ultimate goal of digital archaeology is to recover digital artefacts that have fallen victim to media decay and technology obsolescence in modern culture.

### **2.3.5 Copying or Refreshing**

Copying as a digital preservation strategy is a process of transferring the digital objects to modern access media prior to the obsolescence of the existing media (Lee et al., 2002). Without migration of the digital objects to a more modern access medium, before the current one becomes obsolete, the information will become inaccessible. An example is the migration of digital information from floppy disks to CD-ROMs to enable continued access to the information, as modern hardware technology is no longer compatible with the obsolete floppy disk. This process will ensure the integrity of the digital materials is maintained.

Anyaoku et al. (2019) conducted a study of the digital preservation practices in 24 African university libraries in their institutional repositories. The study was carried out in a divided format, and it involved two stages. The first step involved a detailed review of websites to find out which university libraries have fully developed institutional repositories. The next step involved the implementation of an online survey that was to be used to gather the answers of information from resource librarians and managerial staff. It was found that information migration was the most common strategy among the libraries that took part in the study, with 75% of responses. The other librarians who gave their feedback mentioned encapsulation and refreshing with 35 and 30 percent, respectively. In Nigeria, Baro and Kari (2016) also discovered that about half of the librarians who participated in the survey

were involved in information migration in their institutional repositories. Adu and Ngulube (2016) have carried out a review of the approaches and activities used in the sphere of digital preservation in the context of the public institutions in Ghana. A survey approach was also applied and a questionnaire method was used to collect data in different ministries and agencies. The researchers have carried out a critical review of the current digital preservation policies that these ministries and agencies have used. Migration is the most common strategy used in Ghanaian ministries and agencies in digital preservation. The least implemented digital preservation strategies included refreshing and emulation. The popularity of information migration as one of the approaches to digital preservation can be attributed to the fact that it is easy to combine with modern technologies.

#### **2.4 Institutional Support for Preservation of Digital Content in IRs**

Efficacy of an institutional repository is fundamentally rooted in its capacity to deliver services to a community of users, effectively fulfilling its primary objectives of material submission, metadata application, access control, discovery support, distribution, and preservation. As noted by Gibbons (2004), an IR is not an endeavour that can be characterised as inexpensive or straightforward; instead, it necessitates collaboration and partnership among various units within an organisation, achieved through robust top-down institutional support. The dedication of the institution to information resource projects is crucial, as the responsibilities and expenses tied to such initiatives exceed the capacity of the library department to manage independently. This review encompasses literature about the support and commitment of institutions towards repositories and their associated services.

The University of Toledo in Ohio exemplified its dedication to the IR projects and services by incorporating IR into the institution's strategic planning (Sabharwal & Natal, 2017). The institution incorporated IR into its strategic frameworks and initiatives for education and scholarly inquiry. The authors emphasise that the execution of the strategic plan necessitates a steadfast commitment from the university's management to ensure the sufficient deployment of services within the IR. Moreover, it is important to recognise that collaboration and partnerships, which are crucial for facilitating resource sharing, can be effectively realised through the articulation of strategic plans within the institutions. This approach enables the management of an institution to establish appropriate priorities that can significantly enhance the library's functions, especially about the institutional repository and its associated services. The integration of institutional research within a university's strategic framework will inevitably lead to sufficient staffing and financial resources dedicated to institutional research initiatives.

Giesecke (2011) delineated several evidence-based factors that impact the success of IRs programs or projects. Among these factors are approaches grounded in best practices that are considered effective in addressing organisational challenges. This review highlights a noteworthy best practice concerning the support provided by senior management. The endorsement of senior management for the initiatives related to institutional repositories, including digital preservation, can be termed as an essential prerequisite for the successful implementation of such repositories. The authority to determine the programs that may be pursued resides primarily with the university administration and management, particularly the senior leadership team. This underscores the necessity of providing a rationale to

management regarding the importance of prioritising information services projects, particularly in light of the pivotal role that a library fulfils within a university setting. The safeguarding of institutional scholarly content is an ongoing endeavour that persists for the duration of a university's existence.

The commitment of the management to maintain library services can be illustrated by the partnerships that institutions enter into with the outside world. As a case in point, the University of Zimbabwe, together with the International Network for the Availability of Scientific Publications (INASP), has been cited to have made a significant contribution towards the sustainability of the IR of the institution (Nyambi & Maynard, 2012). Researchers noted that many universities in Zimbabwe are in need of massive support in order to enable them to promote institutional repositories. This claim poses important questions on how committed the management of these universities is towards the promotion of the IR initiatives. The implications of such ambiguity on the support of management imply that the long-term availability of the scholarly contributions of the universities is not guaranteed in future. Partnerships are often important to facilitate the exchange of skills and to gain access to funds, which can be very beneficial to the activities of university libraries in digital preservation of academic content in institutional repositories, so that it is available to future generations.

The management commitment and support in any program is one of the key determinants of institutional success (Adjei et al., 2019). The insufficient support of the top management is one of the preconditions of the unsustainability of the content-centred and technological aspects of digital preservation in the institutional repositories. A proper management framework is capable of increasing the chances of success of digital preservation projects

in institutional repositories (Moulaison Sandy & Corrado, 2017). Adjei et al. (2019) recommended that the successful digital preservation of research outputs in institutional repositories in academic libraries in Ghana requires the support of the senior management. To further demonstrate the importance of digital preservation in the provision of long-term access to content, Adjei et al. (2019) proposed that library personnel must be consulted and involved in every activity associated with the management of institutional repositories, especially where the top management's input is necessary.

Ocholla and Mostert (2021) carried out a study about the quality of service in ten Kenyan academic libraries that were identified using a purposive sampling technique. The researchers used descriptive survey research methodology, and they collected data by use of observation, interviews, and questionnaires. The quality of service is the totality of services provided by the library to its community of users, both inside and outside the institution. One of the major findings that is relevant to the study was the identification of institutional management support as one of the factors that led to the difference in service delivery in the libraries. The management support dimension can be associated with the leadership in the institution. The management should recognise the importance of spending on library services, bearing in mind the important role that the library plays in the institution.

## **2.5 Challenges in Preservation of Digital Content in Institutional Repositories**

Institutional repositories are intended to unify the scholarly output of an institution in one centralised location, rather than distributing it among the numerous available journals. The prominence and recognition of academic material are elevated through its centralisation. Nonetheless, the safeguarding of digital content within institutional repositories may

become unattainable if the challenges encountered, which pose potential impediments to the implementation of services in these repositories, are not addressed. In this section, literature on the issues associated with the preservation of digital content in institutional repositories is discussed. Companies that want to digitise their documents to preserve them in institutional repositories can use these issues to ensure the success of this process.

The inherent challenges of digital preservation are based on the unique characteristics of the objects it aims to preserve and maintain throughout a long period. The digital artefacts, be they created digitally or converted into a digital form, are frequently subject to constant changes and the fleeting nature of the methods used to create, transmit and preserve them. Moreover, it is highly reliant on hardware, software and ancillary technologies to reproduce, which are highly subject to quick obsolescence or physical degradation. In turn, these peculiarities raise the consideration of the questions concerning the trustworthiness, originality, and completeness of digital documents in the context of their administration, maintenance, and sustainability of long-term access. According to the National Archive (2016) and Barbedo, Corujo, and Sant Ana (2011), a true digital document is the one that can be proved authentic and is protected against unauthorised changes. The integrity of a digital document pertains to its condition of being whole and immutable. To uphold integrity, it is imperative to document pertinent information in metadata, which aids in discerning the origin and historical context surrounding the document's creation and maintenance. Santos and Flores (2014) contend that the trustworthiness of a document is contingent upon its chain of custody. A dependable document ought to replicate the same outcomes as those observed at the time of its original creation. To guarantee reliability, the document must exhibit characteristics of integrity and authenticity.

Digital artefacts present significant challenges for preservation in their entirety, owing to their intrinsic separability from their components, unlike more conventional media forms. Maintaining the tangible existence of an object (its data archive) while forfeiting its comprehensibility serves as one illustration; another involves preserving the content of an electronic document yet compromising or altering its layout through ongoing migrations. The delicate nature of digital and electronic documents, influenced by their intricate design, associated costs, rapid technological advancements, and potential physical deterioration, demands targeted initiatives to maintain their original characteristics and their role as reliable records and information sources (Innarelli, 2014).

Most countries in Eastern Africa are demonstrating a commitment and are achieving notable advancements in the preservation of their national heritage (Mutula, 2014). The stated aim of the digitisation efforts is to close the content disparity between developed countries and the region. Nonetheless, Mutula (2014) discerned a plethora of challenges impeding the preservation of digital heritage in this region during her inquiry. The challenges ranged from insufficient human resource capacity to inadequate regulatory and policy frameworks, limited government support, and low bandwidth/connectivity. The researcher noted the lack of uniform standards in the preservation of digital heritage materials, as well as apprehensions surrounding property rights. Mutula's (2014) investigation centred on the administrations in Eastern Africa. In contrast, the current investigation analysed the university and contributed to ascertaining whether the challenges persist unchanged.

Personality psychology is gaining significance in the present dynamics of the modern workplace in regard to the employee behaviour, well-being and performance outcomes.

The growing needs, changing working environment, and the rising mental health challenges have led organisations to seek the right and evidence-based strategies to enhance resilience and reduce stress. One of the Big Five personality traits that has proved to be a major factor that defines how individuals respond to professional demands is conscientiousness. Organisation, goal-orientation, responsibility and self-discipline characterise conscientiousness and indicate how a person can manage his or her actions and be steady in a stressful environment.

Conversely, Evans et al. (2021) provided a less dramatic image by carrying out a longitudinal study of 974 remote employees in the environment of the COVID-19 pandemic. Even though conscientiousness is mostly linked to positive outcomes, their findings showed that conscientious individuals indicated a decline in job performance and job satisfaction when they were forced to work remotely. This means that conscientiousness may not be sufficient to provide a stress cushion in the event of environmental supports or routine breakage. It highlights the relevance of organisational interventions that are aligned with the individual personality traits to ensure engagement and satisfaction amidst the changing work conditions. All these studies point to the fact that conscientiousness is twofold: it promotes job satisfaction and engagement in supportive environments, and it also shows potential weaknesses when structure and predictability are compromised.

According to Baro & Kari (2016), the challenges affecting the Nigerian academic libraries are many; they include technological obsolescence, lack of long-term funding to support

digital preservation activities, lack of digital preservation policy, and the lack of technical staff with the necessary skills in information retrieval. The current budgetary constraints would be prudent to embrace new digital strategies that would not impose a long-term financial burden on the libraries. Libraries have to recognise the limitations of their resources. Hence, there is a need to skilfully manage the limited resources to ensure long-term preservation of digital content. It is imperative to note that universities generate a large and extensive amount of research information despite the shortage of financial resources.

Digital preservation in institutional repositories in South African academic libraries is challenged by a lot of issues. These are lack of procedures, policies, and standards; lack of skills and training in the management of repositories; limited resources; the threat of technological obsolescence; the lack of partnerships and collaborative activities; legal issues; the lack of technological infrastructure; and limited funding (Masenya & Ngulube, 2019; Masenya & Ngulube, 2020). These factors present institutions with a chance to ensure the future sustainability of digital preservation initiatives and continued access to this material in institutional repositories. The challenges related to digital preservation in institutional repositories point to the significance of effective methodologies that guarantee the long-term preservation of the growing volume of digital scholarly content in academic libraries.

## **2.6 Summary and Research Gaps**

The research literature has a significant gap, especially within the framework of the digital preservation policy, both in the local environment of this study and in Kenya in general.

Dressler (2017) also found this gap, admitting that the topic of digital preservation policies does not have significant writings, which is confirmed by the literature review conducted by the author. Moreover, Sanett (2013) indicates that policy in digital preservation programs is usually a poorly developed area. This study does not have many local benchmarks because there is scarce literature on this aspect. This research was conducted to add to the literature that was already in this area.

The situation is comparable to that of digital preservation strategies, as evidenced by the literature on digital preservation policy frameworks. On the subject of digital preservation strategies in Kenya, there is a substantial literature lacuna. The literature is urgently required when it is restricted to the context of this investigation. This subject is rarely found in the major peer-reviewed journal databases in Kenya, as keyword searches yield minimal results. Anyaoku et al. (2019) investigated the strategies implemented in Kenya, with a particular emphasis on DKUT. However, the results of the investigation were inconclusive. This study made a significant contribution to the corpus of literature on digital preservation strategies in Kenya, as well as in the local context.

The obstacles associated with the implementation of digital preservation initiatives in IRs vary from one country to another. Similarly, the obstacles to digital preservation initiatives differ from one institution to another within the same country. The challenges may be more extensive in developing countries. This essentially implies that the challenges faced by a country or institution about digital preservation will not necessarily be the same as those faced by another country or institution. Consequently, the identification of obstacles in a distinct country or institution based on its current circumstances may yield disparate results. This study aimed to identify the challenges associated with digital preservation of

content in IR at KAFU, taking into account the institution's distinctive circumstances that are distinct from those of other institutions.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.1 Introduction**

This section outlines research design, study venue, population of interest to this study and sampling techniques. In addition, it presents the research instruments that were used, as well as their validity and reliability and the procedure applied in collecting data using these instruments. Finally, it presents an explanation of data analysis and ethical and practical issues concerned.

#### **3.2 Research Design**

Easterby-Smith et al. (2012) articulate that a research design constitutes a comprehensive framework that organises every facet of the research endeavour, encompassing gathering and analysing data in a way that is most conducive for achieving the study's aims. This investigation was carried out employing a descriptive research framework. Kothari (2004) articulates that descriptive research involves the meticulous documentation of the current state of affairs by conveying what is presently happening or has transpired in the past. This research approach is appropriate since it primarily provides a comprehensive description of digital preservation at the moment concerning tomorrow's access to digital information within the institutional repositories at KAFU. This descriptive study employed both qualitative and quantitative methodologies by its nature.

#### **3.3 Location of the Study**

The scholarly work was done in the KAFU library, which oversees the digital preservation of all University-generated information. The institution's relative youth was a deciding

factor in selecting this location; it is now collecting data for digital preservation, which will make it possible to retrieve this material in the future. There is also no record of this institution's repository in the OpenDOAR database. There is a thorough review procedure for adding repositories to OpenDOAR, and the KAFU library may not have finished it yet. Regardless of these claims, it is critical to acknowledge that KAFU is a recognised and accredited organisation that could be a useful case study for this research. KAFU is situated in Vihiga County, in the western region of Kenya.

### **3.4 Target Population**

Easterby-Smith et al. (2012) define a population as a collection of individuals from where conclusions are derived. The research population comprised the chief librarian at KAFU library and 45 professional library officers actively involved in the digital preservation function within the institutional repository.

### **3.5 Sampling Techniques and Sample Size Determination**

#### **3.5.1 Sampling Techniques**

Due to the small size of the target population, a census was employed to enumerate participants. Conducting sample surveys is superfluous in instances where the population is constrained, as noted by Kothari (2004). Kothari (2004) posits that, when accounting for time and cost limitations, sample surveys and participant selection emerge as the favoured methodologies (Kothari, 2004).

### **3.5.2 Sample Size Determination**

This study was a census, meaning that the entire population participated in the study. Therefore, no sampling was done in this study.

### **3.6 Research Instruments**

Instruments utilised for gathering data in this research comprised a survey questionnaire and an interview schedule. Appropriateness of these instruments in this research was established by the understanding that the data to be gathered would be primary, and these instruments are specifically crafted for gathering primary data. The researcher utilised a questionnaire to collect data from librarians tasked with digital preservation and institutional repository functions, while the interview schedule guided the researcher in obtaining data from the chief librarian. The questionnaire was meticulously structured to encompass a range of inquiries that aligned with each theme emerging from the study's objectives. The researcher preferred employing questionnaires as a means of data collection, citing several advantages: they serve as a cost-efficient instrument, eliminate the potential for interviewer bias, and allow participants ample time to formulate considered responses. On the other hand, the interview is regarded as a suitable approach that can provide elucidation for specific answers in the questionnaire.

### **3.7 Piloting Study**

This represents a preliminary endeavour that allows the researcher to strategise and refine the main study (In, 2017). The principal objective of executing a pilot survey, according to Malmqvist et al. (2019), is to refine the substance of the study. Kibabii University Library served as the site of a pilot survey to identify potential problems with the survey's questions

and administration. The questionnaire was refined based on insights discovered using a pilot survey. Principal enhancement of the research tool involved refinement of question formulation for clarity of understanding and to eliminate any ambiguity. This aspect enhanced the study's significance, as the researcher might have obtained erroneous responses due to inadequately constructed questions that could have been misinterpreted by the participants. Moreover, the pilot survey enabled the researcher to assess the practicality of the main study regarding its execution and availability of resources, particularly in terms of time and financial implications.

### **3.7.1 Validity of the Study**

Validity pertains to the extent to which a research instrument effectively captures the specific construct it aims to assess. Instrument validity was evaluated by information science specialists. The instrument underwent a comprehensive analysis by specialists in the domain, who offered insights and proposals to enhance its functionality. The inputs were utilised to enhance the tool, thereby guaranteeing its validity.

### **3.7.2 Reliability of the Study**

Capacity of a tool to consistently yield precise and accurate results when applied to the same cohort of participants within a comparable context is reliability (Mugenda & Mugenda, 2003). Test-retest technique was employed to ascertain instrument reliability. The test-retest technique involves administering an instrument to the same participants at various intervals, followed by a comparison of the results from the initial and subsequent tests to assess their congruence (Zikmund, 2010). The interpretation of the resulting

reliability coefficient adhered to the guidelines established by George and Mallery (2003). The pilot study yielded a reliability coefficient of 0.784 from the items examined. Recommendations put forth by George and Mallery (2003) indicate that a coefficient of 0.7 or higher is deemed acceptable for a study. The researcher consequently regarded a coefficient of 0.784 as indicative of the instrument's reliability.

### **3.9 Data Collection Procedure**

Budget estimates were formulated to enable data collection and guarantee the effective implementation of the study. The financial projections for the research were formulated considering all pertinent activities and allocated reserve funds for unforeseen circumstances. In alignment with professional research responsibilities, the data collection site, along with the pertinent authorities and institutions, was engaged to secure the necessary approvals, certifications, and permits.

The questionnaires were distributed to the participants at the designated time on the day of data collection. The researcher-maintained availability during the data collection phase to address any inquiries or concerns that the informants might have expressed. The researcher gathered the questionnaires, satisfied with the duration the respondents dedicated to their completion, in preparation for subsequent data analysis. The investigator sought to ensure a maximal response rate through gathering a substantial quantity of completed surveys.

### **3.10 Examination of Data**

The collected data underwent a thorough cross-verification process to ensure the exclusion of any potentially incomplete questionnaires that might influence the findings due to their lack of completeness. The information gathered in this investigation included both numerical and descriptive elements. Quantitative data was meticulously managed and processed through SPSS, which adeptly facilitated data analysis by employing descriptive statistics. The quantitative data under examination was elucidated through the use of tables, pie charts, and bar graphs. Thematic content analysis was used to evaluate the qualitative data. By using thematic content analysis, the researcher aimed to identify overarching themes in the data and provide narrative explanations of those themes. The presentation included a comprehensive data analysis, followed by a discussion and interpretation of the results, as well as a comparison with the current literature.

### **3.11 Logistical and Ethical Considerations**

#### **3.11.1 Logistical Considerations**

Meticulous and comprehensive planning of research is crucial to circumvent potential challenges that could impede data gathering. The researcher secured necessary approvals and clearances from various institutions and authorities to ensure the successful collection of data, emphasising the importance of meticulous planning. The researcher secured approval from Kenyatta University's graduate school and then proceeded to obtain a data collection permit from NACOSTI. The researcher proactively supplied the KAFU management with the necessary sanction from KU and the permit from NACOSTI, engaging in a discussion regarding the optimal timing for data collection.

The investigator needed to evaluate the financial ramifications of the study's execution to mitigate the possibility of an untimely cessation of the research. The financial implications of this study encompassed the travel to and from the data collection site, subsistence expenses, airtime, consultations, scanning, photocopying, data analysis, and the printing of the final output. The researcher endeavoured to implement cost-saving strategies aimed at minimising expenditures while concurrently ensuring the sustainability and efficiency of the budget. Cost efficiency aims to ensure that the research is conducted within the allocated budget and adheres to the established timeline.

### **3.11.2 Ethical Considerations**

The participants who assisted the researcher in the exploration of this research gave their consent after being well informed on the procedures involved. The involvement in this study was entirely voluntary, and the researcher therefore provided the participants with a detailed explanation of the benefits and rights that they would accrue as a result of their participation. In the consent obtaining process, the researcher gave the participants all the information necessary to understand the nature of the study and the objectives of the study so that they could understand before they could agree to participate. The respondents were allowed to accept or reject their participation by downloading a consent form of the information that came with the questionnaire. The researcher made efforts to ensure that the identity of the participants is not revealed. In a case where the researcher knew the identity of the subjects, the researcher only kept this information to himself or herself, thus, greatly minimizing the chances of the names of the respondents being disclosed. The researcher used coded numbers in the questionnaire as a confidentiality measure. These figures were disposed of by the researcher as the only

person having access to them and were used only once to serve their purpose and were not used afterwards. The researcher has used pseudonyms in this particular case where it was necessary to refer to a name. The researcher did not do anything that would compromise ethical values; he or she was keen to preserve his or her intellectual integrity. To achieve this goal, the researcher was honest during the process and did not engage in any act that may be considered as research misconduct, including data fabrication, falsification, and plagiarism. The researcher recognised the role of all the sources consulted in the preparation of this research, and it was done according to the standards of the American Psychological Association (APA). This was done to ensure that there are no incidences of plagiarism or other unethical activities. Since the researcher was determined to observe the values of honesty and integrity in the academic community, the issue of forgery and fraud was carefully avoided, regardless of the context of the situation.

## **CHAPTER FOUR**

### **PRESENTATION OF FINDINGS, INTERPRETATION AND DISCUSSION**

#### **4.1 Introduction**

This section outlines study findings and offers an interpretation and discussion of these findings regarding study objectives. The discussion of the findings in this chapter is related to the literature reviewed. The presentation of the chapter is based on the objectives, which were to;

1. Investigate the existing preservation policy framework for preservation of digital content in the institutional repository in Kaimosi Friends University library.
2. Determine the digital preservation strategies implemented for the institutional repository in Kaimosi Friends University library.
3. Establish the support of the University Management Board for preservation of digital content in the institutional repository in Kaimosi Friends University library.
4. Establish the challenges encountered in the preservation of digital content in the institutional repository in Kaimosi Friends University library.

#### **4.2 General and Demographic Information**

##### **4.2.1 General Information**

The researcher delivered questionnaires to 45 respondents in Kaimosi Friends University library and provided adequate time for them to complete them. The researcher obtained 43 completed surveys, accounting for a 95.6% return rate. A return rate of 70% or more is appropriate for data analysis (Mugenda & Mugenda, 2003). This return rate was attributable to the researcher's relentless efforts to get respondents to complete and return

the questionnaires. The researcher was unable to gather the remaining questionnaires since the location of the participants who received the questionnaires could not be determined. The researcher verified the completed questionnaires for incomplete ones, which could have influenced the findings. This was done in order to trash the questionnaires. However, all of the returned questionnaires were properly filled.

Following data collection via questionnaires, an interview was performed with the institution's chief librarian. Throughout the interview, the researcher made notes on relevant issues. Furthermore, with the interviewee's permission, the researcher recorded the interview to refer to any points that the researcher may have missed. The interview considerably supplemented the information gathered from the questionnaires.

#### **4.2.2 Age Range of the Respondents**

The objective of the investigation was to determine the respondents' age range. This was essential to determine whether the preservation function of digital content in IR is influenced by the age of the individuals responsible for this function in the library. The results are demonstrated in Table 4.1.

**Table 4.1: Respondents' Age Range**

<b>Age range</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative percent</b>
20-30 years	21	48.8	48.8
31-40 years	14	32.6	81.4
41-50 years	6	14	95.3
Above 50 years	2	4.7	100
<b>Total</b>	<b>43</b>	<b>100</b>	

According to Table 4.1, the age distribution of respondents indicates a predominance in the younger demographics, with 48.8% aged 20-30 years, and 32.6% within the 31-40 years bracket. 14% are aged 41 to 50 years, while merely 4.7% over 50 years of age. Younger respondents (ages 20-40) may exhibit more familiarity and comfort with digital technology in the context of conserving digital content in an institutional repository, owing to their increased propensity to be digital natives or to have experienced more technological breakthroughs. Studies have shown that younger people are usually more skilled in the use and control of digital resources, which may make them more active in protecting digital material. A study by Rowley et al. (2016) also shows the critical role of digital literacy in digital repositories management, and younger users often prove more competent in these areas.

On the other hand, the older age brackets (41 and above) might have little exposure or discomfort with the digital preservation technologies, which might influence their interaction with or input to the digital information in the repository. This aligns with the results of Kim & Stanton (2016), who found that older professionals might require additional training and assistance in the digital content management systems to overcome the obstacles associated with the adoption of technology.

Then the age distribution shows that younger respondents are more willing to actively engage in digital preservation efforts, and the older respondents might need additional support to fully contribute to the maintenance and use of the digital archives of KAFU.

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### 4.2.3 Number of Years Working at KAFU Library

The study aimed to determine the duration of employment of the respondents as information service providers in the library at KAFU. It was essential to determine the duration of employment of the respondents at the KAFU library to assess their level of familiarity with the library's activities. The results are displayed in Table 4.2.

**Table 4.2 Respondents' Length of Working at KAFU Library**

<b>Length</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative percent</b>
Less than 1 year	10	23.3	23.3
1-5 years	22	51.2	74.4
6-10 years	11	25.6	100
<b>Total</b>	<b>43</b>	<b>100</b>	

Table 4.2 displays statistics on the tenure of information service providers at KAFU library, essential for assessing the staff's experience and knowledge with library operations, especially in relation to digital content preservation within the institutional repository. Ten respondents (23.3%) have been employed for less than one year, signifying that nearly a quarter of the personnel are comparatively new to the system. This group may possess restricted familiarity with the long-term operations of the institutional repository. 22 respondents (51.2%) have been employed for a duration of 1 to 5 years, constituting the majority. This indicates that the majority of staff members have acquired a sufficient degree of knowledge of the repository's operations and are poised to contribute to mid-term initiatives for its management.

11 respondents (25.6%) have been employed for a duration of 6 to 10 years. The staff members are the most experienced and may have extensive knowledge regarding the repository's history, modifications, and issues.

The findings indicate that the substantial percentage of employees with fewer than 5 years of experience (74.4%) implies the necessity for ongoing knowledge transfer and capacity-building initiatives. This would guarantee that newer personnel acquire adequate proficiency in the management and preservation of digital information. 25.6% of personnel with over six years of experience can significantly contribute to mentoring less experienced colleagues and maintaining continuity in repository administration. Their prolonged involvement can be utilised to maintain institutional knowledge regarding optimal methods in digital content preservation.

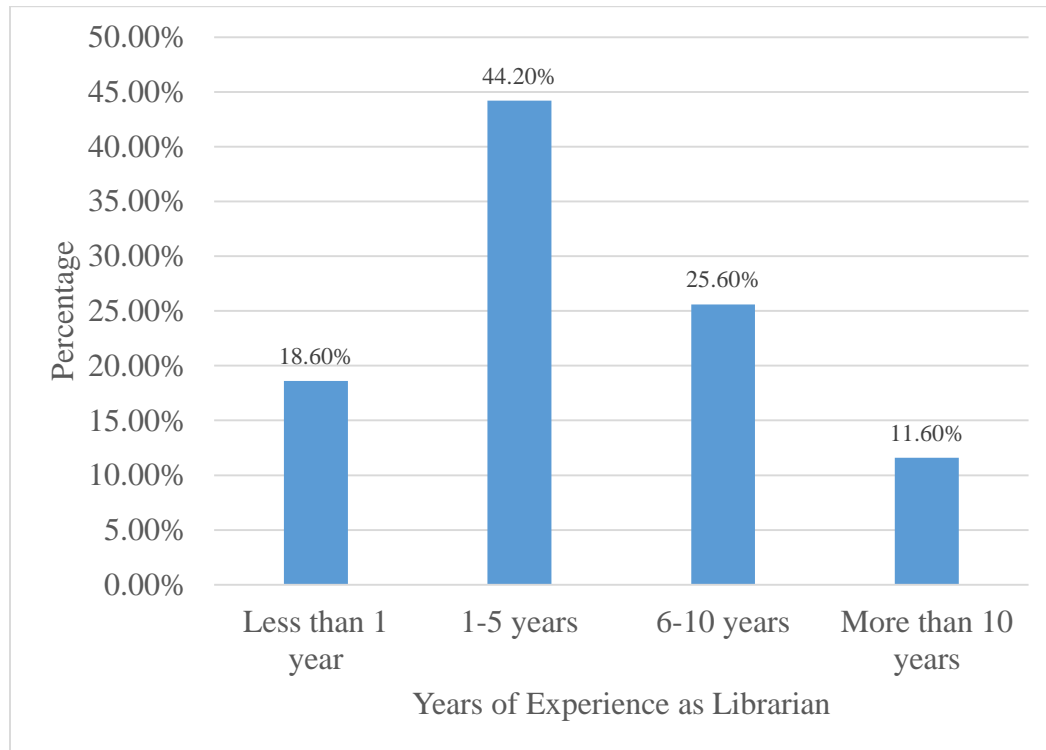
High personnel turnover may adversely impact repository operations, as 23.3% of respondents possess less than one year of experience. New staff may require training in digital content preservation policies, potentially delaying or obstructing repository access if not swiftly resolved.

A significant proportion of personnel with moderate experience (1-5 years) ensures a stable workforce adept at sustaining the repository's everyday operations. Nonetheless, supplementary training and an emphasis on long-term preservation techniques will be essential for guaranteeing ongoing access to digital content.

#### **4.2.4 Cumulative Years of Experience Working as a Librarian**

Research endeavoured to determine the number of years of experience that respondents had worked in the field of librarianship. This was necessary to assess the respondents' level

of familiarity with the preservation of digital content in IR. Figure 4.1 illustrates the findings that were obtained.



**Figure 4.1: Respondents' Years of Experience Working as Librarian**

The results of Figure 4.1 indicate that 19 (44.2%) of respondents had worked as librarians for a period ranging from one to five years, followed by 11 (25.6%) who had worked as librarians for a cumulative duration of six to ten years. Eight (18.6%) of the librarians had been employed for less than a year, while five (11.6%) had been employed for more than a decade. Given the aforementioned findings, it is important to consider that the respondents may possess a greater understanding of the subject of IR and its associated functionalities, including the preservation of digital content to guarantee its future, long-term availability and accessibility. The respondents are likely to be familiar with the current

subject matter due to their cumulative years of experience as librarians, which has resulted in their interaction with IR in their respective workplaces.

### **4.3 Digital Content Preservation Policy Framework**

The first objective of this study was to examine the existence of a preservation policy framework for digital content in the IR. The significance of the digital preservation policy framework is that it emphasises the fact that information services are a component of a system that is based on established practices. The maintenance of order and quality of practices in the preservation of digital materials is contingent upon the standardization of practices.

Establishing the existence of a policy framework was important because preservation for future access needs to be anchored on an existing policy. Hence knowledge of this would shed light on Kaimosi University's digital content preservation.

#### **4.3.1 Existence of Digital Preservation Policy Framework**

It is imperative that all departments that generate digital resources are cognizant of the mechanisms that guarantee accessibility. Consequently, the objective of the investigation was to determine whether the library of Kaimosi Friends University had a digital preservation policy or plan. This was essential because the existence of a policy framework would ensure that digital preservation functions and activities are conducted with the utmost sincerity and adhere to standardised practices, thereby maintaining order and ensuring the quality of practices. The results are represented in Table 4.3.

**Table 4.3: Presence of Digital Preservation Policy Framework at KAFU Library**

<b>Preservation policy</b>	<b>Frequency</b>	<b>Percent</b>
Yes	28	65.1
Not Sure	10	23.3
In the process of developing	4	9.3
No	1	2.3
<b>Total</b>	<b>43</b>	<b>100</b>

Table 4.3 demonstrates that 28 (65.1%) of the respondents reported that the library at KAFU had a preservation policy or plan, while 10 (23.3%) expressed uncertainty regarding the existence of a digital preservation policy or plan. It is also important to mention that four respondents (9.3%) indicated that the library was in the process of developing a digital preservation policy, while one respondent stated that the institution did not have a digital preservation policy framework. The chief librarian's interview verified that the library had a digital preservation policy for digital content. Although the library maintained a digital preservation policy for digital content in the IR, it was determined that the policy was not publicly accessible due to its failure to be published on the IR website. This further indicates that the institution does not have any published policies regarding digital preservation in DOAR.

The fact that the policy had not been made public may have been the reason why some of the respondents stated that they were unaware of it or that it was not present. It is impossible to determine whether the respondents who denied the existence of the digital preservation policy had made any personal endeavours to verify its existence. The indication of some

respondents that they were not sure poses a threat to the future of access and existence of the IR. The discovery that the IR website of Kaimosi Friends University did not contain any policies regarding digital content preservation is consistent with the findings of Da Silva and Borges (2017) in Brazil. Research results show that KAFU is making efforts to guarantee long-term digital preservation of its generated content. However, to maintain preservation in the IR, the institution must be more robust in its efforts. Additionally, the implementation of these policies may be impeded by a multitude of issues if they are not effective. The preservation function in the IR is regulated to guarantee tomorrow's access to digital content, which leads to a sense of order and uniformity.

#### **4.3.2 Familiarity with the Existing Digital Preservation Policy Framework**

Research aimed to determine the extent to which the respondents were acquainted with the digital preservation policy. Respondents were primarily those who reported the existence of a digital preservation policy. The extent to which they are acquainted with the current digital preservation policy would serve as an illustration of their proficiency in the application of conventional preservation functions within the IR for future access. The results are demonstrated in Table 4.4.

**Table 4.4: Respondents' Familiarity with KAFU Digital Preservation Policy**

<b>Familiarity</b>	<b>Frequency</b>	<b>Percent</b>	<b>Valid percent</b>
Very well understood	11	25.6	39.3
Well understood	17	39.5	60.7
<b>Total</b>	<b>28</b>	<b>65.1</b>	<b>100</b>
Missing system	15	34.9	
<b>Total</b>	<b>43</b>	<b>100</b>	

Table 4.4 indicates that 15 individuals (34.9%) declined to respond to this inquiry. Nevertheless, 11 (39.3%) of the 28 (65.1%) respondents indicated that they had a comprehensive understanding of the digital content preservation policy, while 17 (60.7%) stated that they had a good understanding of the preservation policy. None of the respondents indicated that they understood the policy at all or only comprehended it at a minimal level. In essence, the results indicate that 28 (65.1%) of the respondents comprehended the digital content preservation policy for the preservation of digital content in the IR at KAFU. During the interview, the chief librarian expressed the belief that the staff was generally well-informed about the policy's contents. In the interviewee's opinion, this implies that the personnel responsible for the preservation function in the IR may not possess a comprehensive comprehension of the policies. The question of who is involved in the formulation of the digital preservation of digital content in the IR of the institution is raised by this assertion.

The results of this study are in disagreement with those of Umana (2019) in Namibia, who determined that respondents in the libraries of the University of Namibia and the Namibia University of Science and Technology possessed a significant lack of knowledge regarding the long-term preservation of digital content while ensuring its accessibility. It would be prudent to imply that the respondents are fairly familiar with the policies and plans that serve as the foundation for preservation functions and activities in the IR, based on the results of this study. The respondents may be cognizant of the manner in which they are implementing digital preservation in the library. In this regard, future access to digital content in the IR may be achieved as long as the policies and plans regarding digital preservation are implemented and not available as a formality in the library.

### 4.3.3 Frequency of Revision of the Digital Preservation Policy

The study aimed to determine the frequency of revisions to the institution's digital preservation policy. This was necessary because the policy revision is essential for addressing its deficiencies and enhancing the most effective standards and practices. Table 4 illustrates the results.

**Table 4.5** Frequency of Review and Audit of the Policy Framework

<b>Revision</b>	<b>Frequency</b>	<b>Percent</b>	<b>Valid percent</b>
Annually	21	48.8	87.5
Bi-annually	2	4.7	8.3
After 2 years	1	2.3	4.2
<b>Total</b>	<b>24</b>	<b>55.8</b>	<b>100</b>
Missing system	19	44.2	
<b>Total</b>	<b>43</b>	<b>100</b>	

The frequency of the reviews or audits of the institutional repository policy framework is shown in Table 4.5. The findings indicate that 48.8% of the respondents indicated that the policy guidelines on the repository were assessed annually. This implies an active approach to maintaining relevance and ensuring that policies are up to date with technological advancements, regulatory changes and evolving user needs. The benefit of annual assessment to the organisation that aims at improving accessibility and usability is that the organisation can address the problem of the system deficiency before it turns into a problem.

According to Beagrie et al. (2012), frequent policy reviews allow companies to maintain the sustainability and long-term accessibility of the digital repositories through the ability to adapt to the changes in the digital preservation and information management practices. The bi-annual cycle received a response rate of 4.7 %, whereas after two years, it received 2.3 % of responses: A small proportion of them reported that they conduct evaluations less frequently, namely every two years or biannually. Rare evaluations can be an indication of strong rules; however, this can be a source of risks in fast-paced environments, like data control or access privileges. In this case, institutions can face challenges in following the best policies to access repositories in the future. Smith (2015) argues that the low frequency of reviewing the rules of the repository may lead to outdated frameworks that are not responsive to changing needs in user accessibility, data exchange, and technical changes.

The responses are missing in a large proportion (44.2%). This difference can indicate the lack of transparency or consistency in the process of review across institutions or the reduced focus on the assessment and audit of these frameworks. Institutions that do not have defined or written review policies might experience difficulties in maintaining successful and reliable access to their repositories in the long term. Buchanan et al. (2016) found that unclear rules and inadequate review procedures may cause barriers to accessibility, especially when policies in repositories do not match user needs or technological capabilities.

Institutions that regularly review their policies have higher chances of having robust mechanisms of ensuring long-term access to digital resources, responding to changes in the digital environment, and responding to user demands for improved access and usability.

Conversely, those institutions that have erratic or unclear review periods can face future challenges in accessing repositories, including format obsolescence, poor incorporation with new technologies, or legal issues involving intellectual property rights. The figures show that almost half of the respondents' report that the institution has a systematic, annual process of reviewing their repository policy, which is a good sign of future access. Nonetheless, the considerable percentage of absent responses indicates an absence of organised review procedures. This mismatch may jeopardise the long-term viability and accessibility of digital repositories. Institutions can enhance future risk management and facilitate more secure access to digital assets by conducting frequent audits and updating policy frameworks.

During the interview, the chief librarian was quoted as saying;

*“There was a provision in the policy that required an annual review of the policy to take into consideration the shortcomings of the policy and to enhance it by the standards and best practices that are currently accessible. Nevertheless, the organisation has not complied with the requirements of the revision policy, since it was determined during the interview that there had been no revisions carried out.”*

Although, the interviewee further stated that

*“..The revision of the digital preservation policy was necessary to make them effective because failure to do so may in the near future make digital content inaccessible in the IR of the institution.”*

There is a correlation between the findings of this study and the findings of Barrueco and Termens (2022), who performed research on the implementation of policies and plans for digital preservation in organisations. The conclusions of this study are in agreement with their findings. During their examination, the researchers discovered that there is a relatively small body of literature on the subject, which raises doubts about the method by which the policies are being implemented. This implies that the policy is not being amended, which is an action that is not being carried out to the extent that it should be. The conclusion that may be drawn from this discovery is that if adjustments are not made, the outcome will be a digital preservation policy that is feeble and ineffectual, and it may not be able to enable the long-term preservation of digital content in the IR. The fact that this finding was made may also give the impression that the policy is only being offered as a formality, unless there is an effort made to put it into effect. One possible indication that the robustness of such policies is lacking is the fact that there has been no attempt to modify the policies and plans that serve as the basis for the activities and functions associated with preservation.

#### **4.4 Digital Preservation Strategies Implemented for Institutional Repository**

The research also aimed to outline the digital preservation measures used by KAFU Library's institutional repositories. Libraries must implement digital preservation methods to ensure the future availability and accessibility of original digital information in light of the ever-changing technological context. In order for libraries to keep up with the rapidly

developing technology for digital material preservation in institutional repositories, the most effective standards and procedures are essential components.

#### 4.4.1 Respondents' Familiarity with Digital Preservation Strategies

The study sought to find out digital preservation strategies that were familiar to them. Familiarity with the digital preservation strategies would be an indicator of how conversant the respondents are with the library technologies that support digital preservation of digital content. Furthermore, familiarity with the digital preservation strategies could perhaps point out the competence of the respondents. The respondents were asked to tick only the strategies they were familiar with. The findings are presented in Table 4.6.

**Table 4.6: Digital Preservation Strategies Familiar to the Respondents**

Strategies	Responses		Percent of cases
	N	Percent	
Technology preservation	29	21.3	67.4
Technology emulation	16	11.8	37.2
Information migration	24	17.6	55.8
Encapsulation	11	8.1	25.6
Copying/refreshing	23	16.9	53.5
Backup	33	24.3	76.7
<b>Total</b>	<b>136</b>	<b>100</b>	<b>316.3</b>

Table 4.6 indicates that the respondents were cognizant of a variety of digital preservation strategies that could be implemented to guarantee future access to digital content.

Backup accounts were the most widely recognised digital preservation strategy among the respondents, with 33 (24.3%) having implemented it. Backup procedures are a crucial part of digital preservation. To guarantee the sustainability, availability, and integrity of digital resources, they have a major role in the protection process. Backups provide a backup in case of accidental deletion or rewriting of files by another system. Backups ensure that data may be restored even when hardware fails or develops a fault. Having the backups stored in other places or the cloud enables one to avoid physical destruction of the storage systems, which may be through a fire or a flood. Backups come in handy in case of a ransomware attack, which will most probably lead to the encryption of the data or holding the data at ransom. To avoid the long-term effects, the backup systems can restore files infected with malware or viruses. Backups are data that can be used to restore data that has been corrupted over time or due to software problems.

The second strategy that was most frequently used was technology preservation, whereby 29 (21.3%) had adopted the strategy. Preservation of technology is an important part of digital preservation practices because it ensures that digital resources are accessible and usable in future. With the development of technology, the previous formats and applications can be obsolete. Preservation of technology would mean that digital assets are preserved and can be used as the systems evolve. The preservation of technology ensures that the digital assets can be accessed and used as initially designed, regardless of the changes in the hardware and software. Technology preservation is intended to alleviate the danger of losing information due to software and hardware obsolescence. One of the ways through which institutions can reduce the risk of losing valuable information is by retaining the technology that is used in the creation or retrieval of digital assets. It entails making

backups and making sure that digital content can be recovered even when there are technological breakdowns. Preservation of technology allows migration of digital assets to other forms or systems. This is the process of transferring data that is in old technology to modern technology without compromising data. Emulation is possible when migration is not possible through the retention of technology. Emulators simulate the initial technological setting, providing the user with the capacity to operate with digital resources in a manner that they would have been used on the original system. The 24 respondents (17.6%) responded to information migration. Digital preservation strategies must include information migration as it is a necessary element to guarantee the long-term accessibility and usability of digital objects. Migration processes involve verification mechanisms that make sure that the integrity of data is preserved in the transfer. This is to counter data corruption or loss that can occur when data is stored on obsolete media. Any possible problems can be detected and resolved in the process of migration, thus ensuring the correctness and validity of the data that will be preserved. Migration of data to modern forms or systems could make data more accessible. Transformation of obsolete file formats to popular file formats increases accessibility and usability of information. Modern formats frequently include improved metadata and indexing facilities, which aid in the task of searching and finding material.

The other digital preservation strategies were copying/refreshing, which was mentioned by 23 (16.9%). The techniques of copying and refreshing are significant digital preservation methods since they make sure that digital content is available and utilised over time. The

extensive copying of digital material offers security against loss of data due to malfunctioning of devices, corruption, or deletion of data.

Backups are crucial for the restoration process in the event of catastrophic events like fires, floods, or cyberattacks. Storing copies in multiple physical locations reduces the probability of data loss caused by localised occurrences. Distributed repositories and cloud storage services can assist in addressing this issue. As technology progresses, digital formats may become outdated. Preserving several copies in different formats or modifying content to meet current standards ensures sustained availability throughout time. Regularly copying data ensures the preservation of its integrity. Checksums and hashes are useful for identifying and resolving data corruption.

Among the respondents, encapsulation emerged as the least acknowledged digital preservation strategy, representing a mere 11 instances, or 8.1% of the total responses. A range of digital preservation strategies can be employed to ensure ongoing access to digital content within the institutional repository, as articulated in the discussion with the chief librarian. The chief librarian, however, foresaw that some members of the staff might not be fully aware of the comprehensive range of digital preservation strategies that exist.

This finding is in close accord with the findings of Adu and Ngulube (2016) in Ghana, who recorded known digital preservation measures in a manner that is basically identical to the manner in which this study was done. According to this finding, the digital preservation measures that were noted are. In light of this conclusion, it is evident that the respondents had a thorough awareness of the many options that could be utilised in order to secure future access to digital content in the IRs. This is the conclusion brought about

by the previous sentence. It is conceivable that the participants in the survey possess prior knowledge of the strategies being implemented to maintain the ongoing accessibility and availability of digital information, which is proliferating at an increasingly rapid pace. Their understanding of digital preservation techniques for digital content underscores that the intellectual output produced by KAFU remains accessible despite technological advancements. This is due to their familiarity with these strategies.

#### 4.4.2 Digital Preservation Strategies Deployed in the Library

The researcher aimed to investigate the digital preservation measures implemented in the library to ensure the ongoing accessibility of digital content in the future. This was essential to ascertain whether the implemented digital preservation measures would effectively ensure future access to the digital content. The results are displayed in Table 4.7.

**Table 4.7: Digital Preservation Strategies Implemented at KAFU Library**

Strategies	Responses		Percent of cases
	N	Percent	
Technology preservation	26	22.8	60.5
Technology emulation	18	15.8	41.9
Information migration	22	19.3	51.2
Encapsulation	9	7.9	20.9
Copying/refreshing	13	11.4	30.2
Backup	26	22.8	60.5
<b>Total</b>	<b>114</b>	<b>100</b>	<b>265.1</b>

The findings presented in Table 4.7 illustrate the several digital preservation techniques employed by Kaimosi University Library to ensure future accessibility. The adopted

techniques, together with their respective percentages, demonstrate the library's prioritisation of various approaches for safeguarding digital content. Information Technology Preservation (22.8%). This approach, which emphasises the preservation of the original technology or hardware used in the creation of digital information, is the most commonly employed. It indicates that the library prioritises the preservation of the technical integrity of the digital files to guarantee their future availability. Backup (22.8%). Backups are an indispensable safeguard against data loss, and they are equally important as technology preservation. The library allocates resources to consistently generate duplicates of its digital content, therefore guaranteeing the availability of information even in situations of inadvertent deletion or hardware malfunction.

Information Migration: 19.3%. A substantial part of resources is dedicated to information migration, indicating that the library proactively moves digital content to more modern formats or systems in order to prevent the older formats or software from becoming obsolete. Implementing this approach is essential as technology advances. Technology Emulation (15.8%). Through emulation, the library guarantees the accessibility of older digital content by employing software that replicates obsolete computing environments. This approach is less commonly employed in comparison to others, suggesting that it is more precisely tailored for certain situations. Copying/refreshing (11.4%). This approach entails regularly performing data refreshment on the storage medium or duplicating data onto new media to prevent deterioration. The somewhat smaller percentage suggests that this method, although significant, may be of

lesser importance compared to the other strategies in the library's comprehensive preservation initiative.

Encapsulation (7.9%). This approach, which involves storing digital content together with instructions on how to access it in the future, is currently the least used. This approach may be used by the library when digital items necessitate particular contexts for accurate comprehension, but it is implemented selectively. The chief librarian observed that backup and information migration emerged as the foremost digital preservation strategies implemented within the library. Nonetheless, contingent upon the specific digital content designated for preservation, a suitable strategy will be employed to guarantee its accessibility in the future.

This study aligns with the findings of previous researchers, including Adu and Ngulube (2016), Baro and Kari (2016), and Anyaoku et al. (2019), particularly concerning information migration as the foremost strategy in the digital preservation of content within the realm of international relations. The process of information migration entails the transference of digital assets from antiquated technologies to contemporary systems, all the while preserving the essential characteristics of the materials involved. This can be achieved through the conversion or duplication of digital data. This finding suggests that the future will ensure both the availability and accessibility of digital resources, while also safeguarding the integrity of these materials. Furthermore, the chosen digital preservation strategies that have been enacted suggest that future technological advancements in software and hardware may not significantly influence the accessibility of digital

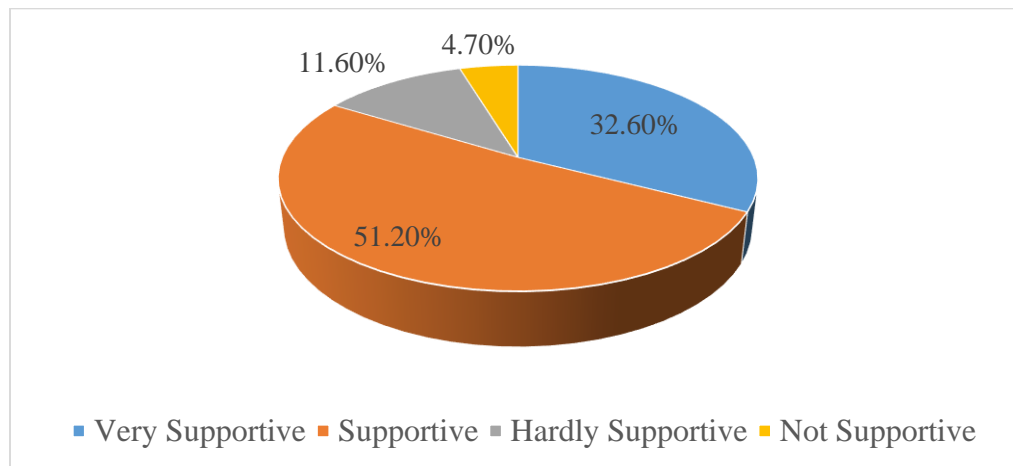
information. This arises from the observation that these strategies focus solely on the digital object, neglecting any environmental considerations.

#### **4.5 Institutional Support for Digital Content Preservation**

The third objective of this study was to investigate institutional support for the preservation of digital content in IR at KAFU. This was necessary because management support in digital preservation of intellectual output for future accessibility is geared towards having commitment and dedication to this course. Management support is aimed at facilitating the deployment or development of services in IRs.

##### **4.5.1 University Top Level Management Support towards IR Services**

The researcher sought to establish the level of university top management support towards IR services. This was necessary in order to establish the extent of commitment that the top university management has in facilitating future access to digital content in the IR. The findings are presented in Figure 4.2.



**Figure 4.2: Level of University Top Management Support towards IR Services**

Figure 4.2 shows that at least 36 (83.7%) of the respondents cited that the university management was either supportive or very supportive in facilitating deployment and or development of IR services, including digital preservation. Five (11.6%) of the respondents cited that the university's top-level management was hardly supportive, whereas 2 (4.7%) stated that the top-level management was not supportive. Just like 83.7% of the respondents, the chief librarian revealed that the university's top-level management support towards IR services was exceptional. This is to imply that top-level management was offering the requisite support needed for deployment of IR services, including digital preservation.

The findings of this study do not agree with those of Ocholla and Mostert (2021), who discovered that the lack of institutional management support was a contributing factor to the gap in service delivery in ten university libraries in Kenya. This finding, on the other hand, is in agreement with the findings of Sabharwal and Natal (2017), who observed that senior management at the University of Toledo in Ohio displayed dedication to IR programs and services. The conclusion that can be drawn from this study is that if senior university management continues to provide assistance, there is a possibility that there will be sufficient deployment of digital preservation services in the IR. This will ensure that future access to digital content that is developed inside the university will be guaranteed. In light of this fact, it may be deduced that the support of institutions is of utmost importance in determining the success of international relations (IR) programs or projects, such as digital preservation.

#### 4.5.2 Support Received from Top-Level Management on IR Services

The researcher sought to find out ways in which the senior management of the university supported the IR initiatives that included the digital preservation function. This was necessary because various forms of support received show the commitment that the senior management has in ensuring that future availability and access to the digital intellectual output from the university could be a guaranteed. The findings are presented in Table 4.8.

**Table 4.8: Forms of Support Received on Deployment of IR Services**

Form of Support	Responses		Percent of cases
	N	Percent	
Capturing IR activities in the strategic programmes, plans of the university	22	16.8%	51.2%
Involving senior library personnel in decision making	35	26.7%	81.4%
Encouraging partnership and collaboration from other institutions	21	16.0%	48.8%
Sponsoring trainings for technical skills relevant to IR management	28	21.4%	65.1%
Prioritizing the library in allocation of financial resources	25	19.1%	58.1%
<b>Total</b>	<b>131</b>	<b>100%</b>	<b>304.7%</b>

The data in Table 4.8 illustrates the various types of support garnered for the implementation of institutional repository (IR) services at Kaimosi University Library. Engaging senior library staff in the decision-making process (26.7%). The most significant type of assistance is obtained by including senior library staff in important decisions, therefore highlighting the importance of their involvement in the effective implementation of information retrieval services. This type of help is likely to enhance the process of planning, allocating resources, and engaging in industrial relations activities.

Providing sponsorship for training focused on technical skills pertinent to IR management (21.4%). This represents the second most prominent type of assistance. Through the provision of financial support for technical skill development, the university is guaranteeing that its personnel have the necessary knowledge and abilities to effectively oversee and sustain the information retrieval system. This expenditure is crucial for the long-term viability and efficiency of information retrieval services.

Granting priority to the library in the distribution of budgetary resources (19.1%). Sufficient resource allocation is crucial for the effective implementation and upkeep of information retrieval services. This type of support implies that although financial resources are significant, they are not given the highest prioritisation in comparison to decision-making and training.

Incorporating information retrieval operations into the strategic programmes and strategies of the institution accounts for 16.8%. By including IR efforts in the strategic plans, the institution shows a lasting dedication to repository services, therefore ensuring their alignment with its overall objectives. Nevertheless, in comparison to direct decision-

making participation and technical training, this type of support appears to be given less emphasis.

Promote the establishment of ties and collaborations with other institutions (16.0%). Although collaborations and partnerships might offer supplementary resources and knowledge, they are considered the least prioritised type of help in this domain. This observation implies that precedence is given to enhancing internal capabilities rather than fostering external partnerships.

Effective implementation of IR services at Kaimosi University Library requires active participation in decision-making, comprehensive technical training, and substantial financial assistance. External collaborations and long-term planning are beneficial; however, they are not prioritised. Future strategies could be improved by adopting a well-rounded approach that strengthens both internal competencies and external strategic alliances.

The findings on the form of support offered towards the deployment of IR services differ from the findings of other researchers whose studies were reviewed in this study. For instance, Adjei et al. (2019) established that the overall management and administration budget of the entire library in Ghana was considered inadequate for management of IR units, while the present study established that KAFU senior management officials prioritise financial allocation to the library. Moseti (2016) found that there was a lack of capacity building of personnel to equip them with technical skills in management of issues associated with digital preservation, whereas this present study found that the senior management of the university sponsored training for the library personnel.

According to Sabharwal and Natal (2017), the University of Toledo in Ohio incorporated research and development projects and services into the strategic planning of the institution. This finding is comparable to the one that was discovered in this study. Generally speaking, the findings of this study seem to indicate that the preservation of digital content at the institution may be ensured over the long term if the senior university management officials provide the forms of support that are supplied. It is possible that the success of this activity will be determined by an honest commitment to supporting the work of the IR, which includes digital preservation. As a result of this discovery, KAFU may be able to successfully pursue IR and associated projects, such as the digital preservation of the digital content that is generated within the agency. The conclusion that can be drawn from the findings of this study is that it is possible for this institution to potentially provide long-term availability and accessibility to the intellectual scholarship that is offered by the university.

#### **4.5.3 Suggestions to Facilitate Support from Top-Level Management**

The researcher sought to obtain suggestions from the respondents on what may be done in order to attain adequate top-level management support towards IR services. This was necessary because obtaining and sustaining support from the top-level management of the university is what may guarantee the success of the IR initiatives, such as digital preservation. This was an open-ended question which required the respondents to cite their suggestions. The researcher sampled the relevant suggestions to this question.

One of the respondents suggested that the library's top-level management should actively participate in its operations. This indicates that the senior management of the organisation

ought to be able to be aware of the information retrieval system (IR) and the steps that must be taken to guarantee the preservation of digital content in order to assure its continued availability and accessibility in the future. If they were directly involved in the operations and running of the library, the top management of the university might be able to gain a first-hand understanding of the reasons why digital preservation might be required in the institution. Their prior experience working in the library may make it possible for them to take into account the requirements of the library and maybe increase the amount of support they provide.

The library should make an effort to position itself in such a way that it is regarded as a highly useful section within the institution, whose presence and operations would impair the operation of the entire institution, according to the opinion of another respondent. The upper management of the organization organisation may recognise the necessity of providing the library with additional support thanks to this approach. Because of this, the library must establish service goals that are attainable and that have an effect on the entire organisation. When the library and the services that are associated with it are regarded as being essential to the operation of the institution, it is important to note that assistance could be directed toward the library.

Another participant who provided feedback expressed their belief that the library ought to undertake the task of upgrading the repository in order to enhance the webometric rating of the institution. The indices that are employed in webometric ranking place a significant emphasis on libraries. Therefore, this indicates that if the library is able to achieve a higher webometric ranking as a result of its efforts, then the senior management of the institution may be motivated to support library services, including the digital preservation activity, to

increase the ranking. The responder believes that a higher ranking for the institution could motivate senior management to provide extra support to the library and the services it provides, particularly the function of digital preservation.

#### 4.6 Challenges in Preservation of Digital Content in IR

The final goal of the research was to identify the obstacles associated with the preservation of digital content within the institutional repository at KAFU. This was essential to facilitate the exploration of solutions to the challenges that could hinder the assurance of future availability and accessibility of digital content in the Institutional Repository at KAFU. The participants were asked to identify the obstacles faced in the preservation of digital content within the institutional repository. The results are delineated in Table 4.9..

**Table 4.9: Challenges Encountered in Preservation of Digital in IR**

Challenge	Responses		Percent of cases
	N	Percent	
Copyright issues	25	11.2%	58.1%
Inadequate infrastructure facilities	32	14.3%	74.4%
Budgetary constraints	31	13.9%	72.1%
Inadequate IR technical skills	27	12.1%	62.8%
Absence of digital preservation policy	8	3.6%	18.6%
Lack of institutional support and commitment	12	5.4%	27.9%
Limited partnerships and collaboration efforts	23	10.3%	53.5%
Poor technology infrastructure	25	11.2%	58.1%
Uncertainty on where to start from	9	4.0%	20.9%
Non-implementation of digital preservation policy	15	6.7%	34.9%
Lack of good-will from top management	16	7.2%	37.2%
<b>Total</b>	<b>223</b>	<b>100%</b>	<b>518.6%</b>

Table 4.9 findings reveal that there exist a number of issues that face the preservation of digital content in IR at KAFU.

Copyright issues got a response rate of 25 (11.2%). That this is so implies that copyright matters have, in a way, been a bane to the digital preservation of the IRs. The results concur with those of Besek et al. (2008), who found that in most cases, digital works are not being systematically saved. This is partly because digital preservation has more problematic copyright issues than preservation of non-digital material. The table 4.9 results show that the response of inadequate infrastructure facilities was 32 (14.3%). This implies that digital preservation is somehow compromised by poor infrastructural facilities.

The response to budgetary constraints was 31(13.9%). The success of an IR largely depends on budgets. Rakemane and Mosweu (2021) carried out research to determine the problems that archival institutions in Sub-Saharan Africa experience in the management and preservation of audio-visual (AV) records and archives. They discovered that the major challenges facing the work of these institutions include budgetary limitation, poor environmental controls, poor training of staff and technological obsolescence. In the issue of poor IR technical skills, 27 (12.1%) respondents mentioned it as a challenge. This means that the prerequisite IR technical skills were challenged. Proper technical skills will ensure efficient organisation, storage and retrieval of data in the repository. This includes information regarding digital preservation techniques, metadata standards and database management. The access of the users is enhanced by professional IR management, and thus the material in the repository becomes easier to search, retrieve and utilise. This requires an acquaintance with accessibility standards, search algorithms, and UI design

principles. This is because sensitive material in the repository should be secured by strong security mechanisms that should be maintained and updated, which requires technical skills. This involves being conversant with encryption, authentication mechanisms and carrying out regular security audits. Overall, technical competence is essential to ensure that an Institutional Repository functions well and in the long term, as it is supposed to.

Lack of digital preservation policy was identified by 8 (3.6) percent of respondents as a challenge. A policy is a necessity in the running of an IR, and thus its non-existence poses a challenge on the workflows and other procedures. Without a written policy, the absence of a systematic manner of storing digital information may lead to the potential loss of valuable information in the long run. This loss may be a result of media degradation, format obsolescence or accidental deletion. Inappropriate preservation and maintenance of digital materials may lead to inaccessibility of the materials. This may occur because of the incompatibility of the hardware and the software components or because of a lack of metadata that is required to describe and identify the data. Different industries and organisations have to adhere to the laws and regulations regarding data storage and maintenance. Organisations without a digital preservation policy risk failing to fulfil legal and regulatory requirements that may lead to financial fines or legal action or reputational loss. Lack of digital data in research-intensive industries may hinder the present and future research activities. The repercussions of this may be a doubling up of the work, wastage of precious research information and a decline in the quality and creativity of research in general.

One of the responses (5.4%) of 12 was a lack of institutional support and commitment as a challenge. Lack of institutional support and commitment may significantly affect the

growth of digital institutional repositories (DIRs), particularly in terms of their effectiveness, sustainability and sustainability. The absence of institutional support and commitment may cause a range of issues that may undermine the effectiveness and sustainability of digital institutional repositories and result in a choice of issues. To make these repositories fulfil their potential as valuable tools that can be utilised by the academic community, it is necessary to make sure that they are supported by the institutions. The joint ventures and partnership programs were scored at 23 (10.3%). Partners can pool their resources to finance the infrastructure, staffing and maintenance of the repository. There is a possibility that better repository systems and tools may be the result of sharing technology and previous experiences. Collaboration can enhance the management of the repository and assist the users, as a wide range of skills and experiences can be united. Collaborations can result in a more diverse and richer collection of objects because it would enable institutions to add new content to it. By establishing alliances with foreign organisations, the repository can potentially gain greater accessibility and fame on the global level. There is a possibility that collaborative work can increase the visibility of repositories, which can subsequently bring more users and contributions. It can be cross-promoted in the participating colleges, which has the potential of increased usage and impact. Team workplaces promote innovative thinking as they allow the sharing of ideas and techniques. Partners can test new technologies and techniques, which usually leads to the improvement of the work of the repository. With this in mind, it is rather likely that limited partnerships and collaboration efforts will negatively affect the welfare of an IR.

A total response of 25 (11.2%) indicated that Poor technology infrastructure was a challenge. Inadequate technological infrastructure can greatly impede the efficiency and

long-term viability of digital institutional repositories. There is a potential for the IR to be negatively affected by ineffective technologies. Limiting the amount of data that can be kept as well as the sort of data that can be stored, for instance, might lead to selective archiving and the possibility of data loss. This raises the possibility of cyberattacks, data breaches, and the loss of critical information. Reduces the speed at which users can access the content of the repository, which leads to a terrible user experience and decreased utilisation. Providing support for contemporary digital formats and standards is difficult due to the limited functionality, compatibility, and performance of this technology. This prevents the repository from being integrated with other platforms and systems, which in turn restricts its capacity and usefulness. People will have a more difficult time finding and accessing content, which will result in decreased usage and engagement. Delays in fixing technical issues can make access more difficult and diminish the level of satisfaction experienced by users.

In summary, it is notable that the three major cited challenges were inadequate infrastructure facilities (14.3%), budgetary constraints (13.9%) and inadequate IR technical skills (12.1%). The least cited challenge was the absence of a digital preservation policy, which accounted for 3.6%. According to the chief librarian, an enabler of the majority to overcome the challenges in preservation of digital content is budget. It was revealed through the interview that funding is suppressed, and therefore, management has to allocate the limited financial resources among the many competing interests in the institution. To a large extent, the chief librarian thought that the major challenge was the limited budget, whose adequacy would have overshadowed other challenges.

According to the findings of Joo et al. (2018), the deployment of services in the IRs was hampered by insufficient resources, specifically a lack of human and financial resources. Both the findings of this study and those of Joo et al. (2018) are in agreement with one another. If certain issues are not addressed, it is possible that the deployment of services in the immediate vicinity, including digital preservation, may be restricted. If the difficulties were kept to a minimum, then all of the activities that are related to the digital preservation of the digital information would continue to function without any interruptions. Even though the senior management of the institution places a high emphasis on the provision of financial resources to the library, this finding may indicate that measures concerning digital preservation may be maintained. This is the case despite the fact that the library received a high priority. This result suggests that the library is responsible for taking measures on its own to ensure that digital content produced by the institution will continue to be available and accessible in the future. This conclusion is based on the findings that were obtained.

#### **4.6.1 Suggestions for Addressing Challenges in Preservation of Digital Content**

The researcher sought respondents' opinions on how challenges in the preservation of digital content could be addressed. This was necessary in order to obtain suggestions that may be helpful to address the challenges that could be hindering effective and efficient deployment of digital preservation in the IR. This was an open-ended question that allowed respondents to express their views. Some of the respondents cited priority in allocation of funds to the library, particularly. The funds allocated, it was noted that should not be simply for administration and operations, but dedicated specifically for IR. Having a dedicated

budget, particularly for the IR, would perhaps ensure that the IR and all the initiatives related to it are sustained.

Some additional respondents mentioned the necessity for staff training in IR technical abilities as a method to overcome the difficulties. Having technical abilities is necessary for the deployment and operation of the IR, and general skills may not apply to it to a significant degree. To ensure the continued availability and accessibility of digital content in the future, it is vital that library officers get training and retraining on the administration and management of information management, particularly to the preservation of digital content. All that this simply means is that there have to be staff who are capable of handling issues that are associated with the system.

Regarding the necessity of the institution providing support by putting in place additional technological infrastructure, one of the respondents mentioned this requirement. If the institution makes it a priority to strengthen its technology infrastructure, it may be able to more readily implement the many tactics that are involved in digital preservation. A significant investment in the most recent technology would be of great assistance in guaranteeing that technological obsolescence does not make it impossible to access and make digital information available in the future. On the other hand, the respondents believe that this extends to the library, even though the technology is being improved across the entire institution.

It was suggested by another respondent that the staff of the library should tour and learn from institutions that have established and well-developed IRs. By doing so, the respondent believes that they will be able to acquire knowledge regarding the most effective methods

of digital preservation in IR, which may then be transmitted and implemented into KAFU. Some of the technological challenges that could potentially impede the availability and accessibility of digital information in the future could be addressed with the assistance of benchmarking, which could be advantageous. This approach may enable those who are benchmarking to gain a comprehensive understanding of the nature of digital content preservation and potentially equip their IR to facilitate the future availability and accessibility of digital content. Another respondent proposed that benchmarking could be further improved by establishing or increasing partnerships.

The preservation of digital content in the institutional repository of KAFU is full of challenges, and it requires personalised solutions to each issue. Putting in place clear license agreements will ensure that the rights of the digital content are well defined and the institution complies with the copyright laws. This involves seeking permission to use and replicate content (Harris & Spence, 2020). Training employees and scientists about copyright matters may help to avoid unintentional copyright violation and encourage digital content management (Baker, 2021).

Invest in physical and digital infrastructure to support effective digital preservation. This includes the improvement of storage systems, network functions, and backup (Miller & Wang, 2019). Invest in infrastructure development in budgetary planning and seek external grants or partnerships to support such spending (Anderson, 2022). Develop an effective budget plan that allocates resources to digital preservation projects effectively. It involves setting priorities in critical preservation work and increasing the use of resources (Johnson & Carter, 2021).

Seek grants and financial opportunities with government agencies, foundations, and industry partners to reduce budget constraints (Taylor, 2023). Introduce ongoing training programs to develop and enhance the technical skills of staff in digital preservation and repository management (Nguyen & Ellis, 2022). Hire or consult specialists in the field of digital preservation to reduce the lack of skills within the institution (Smith & Thompson, 2020).

Formulate a detailed digital preservation policy that delineates methods, responsibilities, and standards for the conservation of digital content. This policy must be customised to meet the institution's specific requirements (Roberts & Lee, 2021). Guarantee the proper implementation of the policy by training, periodic evaluations, and revisions to accommodate evolving technology and requirements (Green & Harris, 2019). Promote digital preservation inside the institution by emphasising the significance of safeguarding digital content for future research and institutional credibility. This entails showcasing case studies and success narratives to decision-makers (Martin, 2020). Implement awareness campaigns to inform the institution's leadership of the advantages and imperative nature of digital preservation (Brown & Adams, 2021). Establish collaborations with other institutions, organisations, and industry specialists to exchange resources, expertise, and exemplary practices in digital preservation. Collaborative initiatives can improve preservation efficacy and save expenses (Johnson & White, 2022). Participate in national and worldwide digital preservation networks and consortia to be informed about developments and utilise shared expertise (Smith & Baker, 2023).

Rectify inadequacies in technological infrastructure by enhancing hardware and software to facilitate digital preservation initiatives. This includes the provision of resilient storage solutions, dependable network connectivity, and current software tools (Miller & Davis, 2020). Invest in cutting-edge technology to improve preservation capacities and guarantee alignment with forthcoming standards (Walker & Taylor, 2022).

Develop a comprehensive digital preservation roadmap that delineates the actions, objectives, and milestones necessary for launching and enhancing digital preservation initiatives. The roadmap must incorporate a staged strategy and prioritise initiatives according to urgency and impact (Anderson & Martin, 2021). Consult digital preservation specialists to inform the creation and execution of the roadmap (Roberts & Lee, 2022).

Implement monitoring methods to ensure adherence to digital preservation policies and procedures. Systematic audits and assessments can facilitate compliance and pinpoint opportunities for enhancement (Nguyen & Ellis, 2021). Enforce steps to rectify non-compliance and underscore the significance of adhering to established policies (Brown & Adams, 2020).

Formulate ways to include senior management by illustrating the strategic significance of digital preservation to the institution's mission and objectives. Provide statistics and case studies demonstrating the advantages of efficient preservation (Martin & Johnson, 2022). Demonstrate concrete advantages and return on investment (ROI) from digital preservation initiatives to secure backing and dedication from leadership (Walker & Roberts, 2023).

These solutions will help KAFU overcome the difficulties of digital content preservation and make sure its digital repository is usable and accessible for the future.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents a summary of the findings of the study; conclusions made from the findings and recommendations based on these findings. In addition, it presents suggestions for further research.

#### 5.2 Summary

The purpose of this study was to investigate digital content preservation strategies that would ensure the continued availability of KAFU Library's institutional repository. The study set out to accomplish several important goals, including: investigating the state of digital content preservation policies within the KAFU library's institutional repository; analysing the digital preservation strategies currently in place; determining the level of support from the University Management Board for digital content preservation within the repository; and finally, identifying the obstacles currently encountered in this process. Data was collected from 45 participants using questionnaires and an interview with the chief librarian to accomplish the goals of this study. The analysis of the collected data was conducted primarily through descriptive statistics and narrative accounts. The research aimed to examine the current policy framework governing the preservation of digital content within the institutional repository at KAFU Library. Initially, it was determined that the institution possessed a digital preservation policy; however, it was not made available on the institutional repository website or in the Directory of Open Access Repositories. Secondly, the study demonstrated that the respondents possessed a commendable level of familiarity with and comprehension of the digital content

preservation policy within the institution. Ultimately, the research observed that the digital preservation policy was intended for yearly reassessment; however, the anticipated revisions were not being executed as outlined in the policy.

The researcher examined the digital preservation methodologies employed within the institutional repository at KAFU Library. The research delineated the familiarity with digital preservation strategies in the following order: backup (76.7%), technology preservation (67.4%), information migration (55.8%), copying/refreshing (53.5%), technology emulation (37.2%), and encapsulation (25.6%). The notable digital preservation strategies implemented in the IR included backup (60.5%), technology preservation (60.5%), and information migration (51.2%). The strategies for digital preservation implemented are likely to ensure the future availability and accessibility of the digital content produced within the institution.

The third objective of the study was to ascertain the degree of institutional backing for digital preservation initiatives within the library. A significant 83.7% of respondents indicated that the university administration demonstrated either support or strong support for digital preservation initiatives. The predominant types of assistance reported included the engagement of senior library staff in decision-making processes, noted by 81.4% of respondents, followed by sponsored training programs aimed at enhancing technical skills pertinent to information resource management, acknowledged by 65.1% of participants. The final goal of the research was to identify the obstacles associated with the preservation of digital content. The primary obstacles identified were insufficient infrastructure facilities (74.4%), financial limitations (72.1%), and a lack of adequate technical skills in

industrial relations (62.8%). Nevertheless, financial limitations often encompass a multitude of additional difficulties, as these challenges could be mitigated with the proper allocation of resources. To tackle these challenges, it has been proposed that prioritising the allocation of financial resources to the library is essential, staff training to develop information retrieval technical skills should be pursued, and the implementation of a digital preservation policy is necessary.

### **5.3 Conclusions**

The subsequent conclusions emerge from the study's findings: The preservation of digital content within the institutional repository is regulated by a comprehensive digital preservation policy framework established at the KAFU library. However, the policy remains inaccessible for public examination on the IR website or within the DOAR. While the policy delineates an annual revision, such updates do not transpire as stipulated within the framework of the policy. In light of the digital preservation strategy established for the IR, it has been concluded that KAFU possesses the capability to guarantee the future availability and accessibility of digital content generated within the institution through the application of information migration, technology preservation, and backup methodologies. These represent commonly employed strategies for digital preservation within institutional repositories.

It can be deduced that the senior management of the university demonstrated a profound commitment to endorsing the library's endeavours in the institutional repository concerning the digital preservation of content, as indicated by the institutional backing for repository initiatives and activities. The library's senior management is the preferred upper echelon for endorsing initiatives related to digital preservation. A multitude of challenges hinders

the implementation of digital preservation within the institutional repository, including financial limitations, inadequate infrastructural resources, and a lack of requisite technical expertise in the repository's operations. Nonetheless, the backing from the institution's senior management indicates that the challenges at hand are unlikely to significantly jeopardise the future availability and accessibility of digital content.

#### **5.4 Recommendations**

The institution can guarantee the forthcoming availability and accessibility of preserved digital content in the institutional repository by implementing the recommendations delineated in the study.

Initially, the research indicates that KAFU ought to propagate the digital preservation policy on the institutional website that accommodates the IR and within the DOAR. One of the factors employed in webometrics ranking is the published policy of the institutional IR website and DOAR. Furthermore, it is recommended that a yearly audit and assessment of this policy be carried out to guarantee its alignment with the latest standards and practices.

Furthermore, the research indicates that KAFU should persist in executing the most commonly utilised digital preservation methodologies, such as information migration, backup, and technology preservation. These represent digital preservation strategies that are widely adopted globally within the IR to guarantee the future availability and accessibility of digital content.

The findings indicate that the university management board ought to either sustain or enhance the support allocated to the library, particularly highlighting the importance of

preserving digital content. The initiative stands to achieve success contingent upon the sustained backing for the digital preservation of content within the institutional repository. Ultimately, the research indicates that to surmount the challenges faced, it is essential to designate particular financial resources for IR and related initiatives. Additional initiatives may be necessary to guarantee the continued availability and accessibility of the preserved digital content in the institutional repository, contingent upon the allocation of financial resources.

### **5.5 Suggestions for Further Research**

The following suggestions are made for further research;

1. A study on adherence to standards of digital preservation in IR in academic libraries.
2. A survey of the IR infrastructure in academic libraries in Kenya.
3. A study on digital preservation practices deployed in IR in academic libraries.

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## APPENDICES

### APPENDIX I: INFORMED CONSENT

Dear participant,

My name is Jacob Bushuru, a postgraduate student at Kenyatta University. I am conducting a study titled “Preservation of digital content in institutional repositories: A case of Kaimosi Friends University Library”. This study aims to investigate the preservation of digital content to ensure future access to the the institutional repository at KAFU library. In addition, this study will help me fulfill the University requirements for the course I am undertaking.

The study intends to make a contribution to our understanding of preservation of digital content in ensuring future access to institutional repositories of university libraries. As a consequence of the knowledge gained from this research, there will be a contribution to the literature regarding preservation and institutional repositories in information science. The findings arising from this study will be accessible as a peer-reviewed article in an academic journal after publication. This study will rely on questionnaire to collect data from the participants and the exercise will last not more than 10 minutes.

Your involvement in this study will be strictly confidential as none of your identity details of the participant will be disclosed to any party. Additionally, you are at liberty to withdraw from the study without consequence as your participation is strictly voluntary. However, you may seek clarification from the researcher during the study.

Kindly sign and date this consent if you agree to participate. Thank you.

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Participant signature

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Date

## APPENDIX II: QUESTIONNAIRE FOR DIGITAL PRESERVATION STAFF

### Section A: General Information

1. Kindly indicate your age range.

20 – 30 years [    ]                      31 – 40 years [    ]

41 – 50 years [    ]                      above 50 years [    ]

2. How long have you worked in this library?

Less than 1 year [    ]                      1-5 years [    ]

6 – 10 years [    ]                      More than 10 years [    ]

3. What is your cumulative experience as a librarian?

Less than 1 year [    ]                      1-5 years [    ]

6 – 10 years [    ]                      More than 10 years [    ]

### Section B: Digital Content Preservation Policy Framework

4. Does the library have a digital preservation policy or plan for preservation of digital information in the institutional repository?

Yes [    ]                      Not sure [    ]                      In the process of developing [    ]

No [    ]

5. If your answer to the above question is “yes”, how would you rate your understanding of the policy?

Very well understood [    ]                      Well understood [    ]

Hardly understood [ ]      Not understood [ ]

6. If your answer to question 1 is “yes”, how often is the policy revised?

Annually [ ]      Bi-annually [ ]

After 2 years [ ]      It's never revised [ ]

### **Section C: Digital Preservation Strategies**

7. Which among the following strategies of digital preservation are you familiar with?

Strategy	Tick (where applicable)
Technology preservation	
Technology emulation	
Information migration	
Encapsulation	
Copying/refreshing	
Backup	

8. Which among the following digital preservation strategies are deployed in your library for digital preservation?

Strategy	Tick (where applicable)
Technology preservation	
Technology emulation	
Information migration	
Encapsulation	
Copying/refreshing	
Backup	

### Section D: Institutional Support for Digital Content Preservation

9. How would you describe support of top-level management of the university towards institutional repository services?

Very supportive [ ] Supportive [ ]

Hardly supportive [ ] Not supportive [ ]

10. In what ways is the library receiving support from top level management of the university towards institutional repository services?

Support	Tick (where applicable)
Capturing IR activities in the strategic programmes, plans of the university	
Involving senior library personnel in decision making	
Encouraging partnership and collaboration from other institutions	
Sponsoring trainings for technical skills relevant to institutional repository management	
Prioritizing the library in allocation of financial resources	
Other (please specify)	

11. In your opinion, what should be done in order to attain adequate top level management support towards institutional repository services?

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### **Section E: Challenges in Preservation of Digital Content**

12. Kindly tick and specify any other challenges encountered in preservation of digital content in your library's institutional repository.

<b>Challenge</b>	<b>Tick (Where necessary)</b>
Copyright issues	
Inadequate infrastructure facilities	
Budgetary constraints	
Inadequate IR technical skills	
Absence of digital preservation policy	
Lack of institutional support and commitment	
Limited partnerships and collaboration efforts	
Poor technology infrastructure	
Uncertainty on where to start from	
Non-implementation of digital preservation policy	
Lack of good-will from the top management	
Other (Please specify)	

13. Suggest ways in which these identified challenges can be addressed.

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### **APPENDIX III: INTERVIEW SCHEDULE FOR CHIEF LIBRARIAN**

The researcher will;

- i. Introduce himself before the interviewee and explain the purpose of the interview.
- ii. Request the interviewee introduce him/herself.

Questions

1. Kindly describe the preservation policy framework for preservation of digital content in IR and its appropriateness as well as limitations in your institution.
2. What digital preservation strategies do you adopt for preservation of content in your IR?
3. Kindly explain your preservation strategies and reasons for your preference.
4. How would you describe the support of University Management Board on digital preservation initiative?
5. What would you consider as challenges in preservation of digital content in IR?
6. What suggestions would you provide to address the challenges you have cited?

## APPENDIX IV: RESEARCH APPROVAL



KENYATTA UNIVERSITY  
GRADUATE SCHOOL

E-mail: [dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 810901 Ext. 4150

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

Internal Memo

FROM: Executive Dean, Graduate School

DATE: 29<sup>th</sup> May, 2023

TO: Musisi Jacob Bushuru  
C/o Library & Information Science.

REF: E65/OL/KKA/32644/2016

SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL


This is to inform you that Graduate School Board at its meeting of 22<sup>nd</sup> May, 2023 approved your Research Project Proposal for the M.LIS Degree Entitled, "Preservation of Digital Content in Ensuring Future Access to Institutional Repository: A Case of Kaimosi Friends University College Library, Vihiga County, Kenya".

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your project before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

Thank you.

  
**ELIJAH MUTUA**  
**FOR: EXECUTIVE DEAN, GRADUATE SCHOOL**

c.c. Chairman, Library & Information Science Department.

Supervisors:

1. Dr. Caroline Mutwiri  
C/o Department of Library & Information Science,  
Kenyatta University

EM/lnn



KENYATTA UNIVERSITY  
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P.O. Box 43944, 00100  
NAIROBI, KENYA  
Tel. 8710901 Ext. 97530

Our Ref: E65/OL/KKA/32644/2016

DATE: 29<sup>th</sup> May, 2023

Director General,  
National Commission for Science, Technology  
and Innovation  
P.O. Box 30623-00100  
NAIROBI

Dear Sir/Madam,

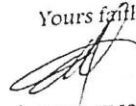
RE: RESEARCH AUTHORIZATION FOR MUSISI JACOB BUSHURU – REG. NO.  
E65/OL/KKA/32644/2016.

I write to introduce Musisi Jacob Bushuru who is a Postgraduate Student of this University. The student is registered for M.LIS degree programme in the Department of Library & Information Science.

Musisi intends to conduct research for a M.LIS Project Proposal entitled, "Preservation of Digital Content in Ensuring Future Access to Institutional Repository: A Case of Kaimosi Friends University College Library, Vihiga County, Kenya".

Any assistance given will be highly appreciated.

Yours faithfully,

  
✓ PROF. ELISHIBA KIMANI  
EXECUTIVE DEAN, GRADUATE SCHOOL

EM/inn

## APPENDIX V: RESEARCH AUTHORIZATION

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KAIMOSI FRIENDS UNIVERSITY (KAFU)

Library Department

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Our Ref: KAFU/COR:514/021(202)

Date: 20<sup>th</sup> October,2023

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION

The library is in receipt of letter from National Commission for Science, Technology and Innovations dated 17<sup>th</sup> July, 2023 authorizing research on **“Preservation of Digital Contents in Ensuring Future Access to Institutional Repository Data: A case study of Kaimosi Friends University Library, Vihiga County, Kenya.”**

This is to inform you that **Musisi Jacob Bushuru** has been authorized to conduct the research. Kindly accord him necessary assistance.

Regards.

A handwritten signature in blue ink, appearing to read "Dennis Imbiakha", is written over a light-colored rectangular background.

Dennis Imbiakha

Senior Library Assistant

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